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Preprint

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Suggested Citation: Gnangnon, Sèna Kimm (2022) : Effect of the Duration of the Membership in GATT/WTO on Commercial Services Exports in Developing Countries, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/262167>

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Effect of the Duration of the Membership in GATT/WTO on Commercial Services Exports in Developing Countries

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Manuscript date: August 2022

Abstract

The present article has investigated the effect of developing countries' duration of membership in the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) on their commercial services exports. It has relied on a set of 128 countries over the period from 2008 to 2019, and utilized the two-step system generalized method of moments estimator. It has revealed that the duration of membership in the GATT/WTO was associated with higher commercial services exports, including both modern and traditional services exports. However, Article XII Members (states that were not Members of GATT, but joined the WTO after its inception) have experienced higher commercial services exports (including traditional services exports) than Non-Article XII Members (i.e., states that were GATT Members before the creation of the WTO). For low-income member states, the membership duration has resulted in an increase in traditional services exports at the expense of modern services exports. Conversely, relatively wealthier member states have increased modern services exports at the expense of traditional services exports, as their membership duration rose. The analysis has also established that member states that have improved their capacities to use, adopt and adapt frontier technologies have enjoyed higher commercial services exports, including modern services exports, but have not experienced an increase in traditional services exports. Finally, the duration of membership in the GATT/WTO has led to higher commercial services exports, including both modern and traditional services exports for member states that have improved their penetration in the international markets for goods. The policy implications of the analysis are discussed.

JEL Classification: Duration of membership in the GATT/WTO; Commercial services exports; Frontier technology readiness; Penetration in goods markets.

Keywords: F15; O14; F53.

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1. Introduction

The global economy has witnessed a significant expansion of services exports, which have become the most dynamic component of international trade (WTO, 2019). Services production and exports contribute significantly to economic growth and development, particularly in developing countries (e.g., Anand et al., 2012; Gnanngnon, 2021a; Hoekman, 2017; Hoekman and Shepherd, 2017; Liu et al., 2020; Nayyar et al., 2021; Roy, 2019; Stojkoski et al., 2016; WTO, 2019).

Trade policies concerning the cross border movement of goods have been liberalized under the General Agreement on Tariffs and Trade (GATT²), and much more recently under the World Trade Organization whose Agreements cover not only trade in goods (as under the GATT) but also trade in services and trade-related intellectual property rights. The commitments by Members of the GATT and the WTO to reducing and binding tariffs and to limiting the use of non-tariff barriers have contributed significantly to improving the predictability and stability of the trading environment for goods (e.g., Chowdhury et al., 2021; Koopman et al., 2020; Limão and Tovar, 2011; Mansfield and Reinhart, 2008; Osnago et al., 2018; WTO, 2014). The dispute settlement mechanism under the GATT and the WTO contributes to further enhancing the predictability and stability of trading conditions by ensuring the effective enforcement of WTO rules (e.g., Balding, 2010; Davey, 2009; Hudec, 1993; Shin and Ahn, 2019). The WTO can also help improve governance³, domestic policies and trade-related institutions in its member states (e.g., Aaronson and Abouharb, 2014; Basu, 2008; Drabek and Bacchetta, 2004). Thanks to these benefits of the GATT and the WTO, trade in goods has expanded considerably (e.g., Dutt, 2020; Dutt et al., 2013; Eicher and Henn, 2011; Herz and Wagner, 2011; Koopman et al., 2020; Larch et al. 2019; Subramanian and Wei, 2007).

The multilateral liberalization of services trade policies takes place under the General Agreement on Trade in Services (GATS), which is the first and only existing multilateral agreement covering trade in services. It entered into force at the inception of the WTO in January 1995. Thus, in contrast with the GATT that did not deal with services trade liberalization, the WTO provides a forum for devising rules concerning services trade liberalization.

In a recent paper, Gnanngnon (2022a) has examined the effect of the WTO membership on commercial services exports for Article XII⁴ Members, including compared to Non-Article XII Members. Article XII Members are states that have joined the WTO under the Article XII of the Marrakesh Agreement establishing the WTO. The process of accession to the WTO by Article XII Members is more stringent than the one undergone by original WTO Members (i.e., states that were Members of the GATT, but joined the WTO). The focus of the study by Gnanngnon (2022a) on Article XII Members in comparison with Non-Article XII Members is dictated by the fact that Article XII Members have undertaken higher commitments under the GATS than Non-

² The GATT focused on the reduction of border barriers to trade.

³ In a related work, Dreher and Voigt (2011) have found that the membership in international organizations, including for example the WTO, significantly improves member states' credibility.

⁴ Article XII of the Marrakesh Agreement establishing the WTO is related to the accession of states or customs territory to the WTO, and provides that "*Any State or separate customs territory possessing full autonomy in the conduct of its external commercial relations and of the other matters provided for in this Agreement and the Multilateral Trade Agreements may accede to this Agreement, on terms to be agreed between it and the WTO. Such accession shall apply to this Agreement and the Multilateral Trade Agreements annexed thereto*" (see Article XII.1). Further information on Article XII is available online at: https://www.wto.org/english/docs_e/legal_e/04-wto.pdf and https://www.wto.org/english/thewto_e/acc_e/acces_e.htm

Article XII Members. Gnanon (2022a) has shown that the WTO membership has been instrumental in fostering Article XII Members' commercial services exports, including both modern and traditional services exports. The analysis has also revealed that Article XII Members performed differently from Non-Article XII Members in terms of commercial services exports.

The present article builds on the work by Gnanon (2022a) to investigate the effect of developing countries' duration of membership in the GATT and the WTO on commercial services exports. Thus, the present analysis departs from that of Gnanon (2022a) by shedding light on how the duration of membership in both the GATT and WTO (and not the mere membership in the WTO only) affects commercial services exports, including both modern and traditional services exports.

The duration of the membership in the GATT and the WTO captures not only the 'membership' element, but also the time spent by a state as a member of the GATT and/or the WTO. The membership duration captures the extent of improvement of trade policies over time in the organization thanks to the multilateral surveillance of trade policies by member states. In other words, as Members of the WTO (the same applies to the GATT) are subject to a regular surveillance of their trade policies, including the compliance with their commitments at the WTO, and the fulfilment of their obligations in WTO rules (e.g., Ghosh, 2010; Marceau and Garg, 2021), it is likely that they improve their trade regimes over time. We argue that while Members undertook multilateral commitments to liberalize services sectors only under the WTO (which could have affected commercial services exports), both the GATT and the WTO had contributed to enhancing services exports through their effects on goods exports (e.g., Eichengreen and Gupta, 2013a).

Against this background, we first hypothesize that the duration of the membership in the GATT and WTO enhances commercial services exports in countries that have increased their goods exports. On another, members' commitments under the GATS to reduce barriers to services trade complement their commitments in various regional trade agreements to open services sectors, and to reduce the uncertainty faced by domestic and foreign firms. This could encourage the expansion of commercial services exports. Therefore, we postulate the second hypothesis that as the time spent by Members in the WTO increases, they may improve their services trade policies, which would contribute to fostering commercial services exports. Overall, we expect that the duration of the GATT/WTO membership can affect commercial services exports through its effect on goods exports, as well as through services trade policy liberalization. Specifically, we expect this effect to be positive as the duration of the GATT/WTO membership increases. However, the magnitude of this positive effect (if any at all) may not be the same for Article XII Members and for Non-Article XII Members, and across countries in the full sample. Even though Article XII Members undertook higher commitments under the GATS than Non-Article XII Members, they might not necessarily enjoy greater services exports than Non-Article XII Members as their membership duration increases. This is because other factors than the domestic services markets liberalization matter for promoting commercial services exports. These factors include for example, the development level, human capital, access to finance and the ability to use effectively technological tools (e.g., Goswami et al., 2012; Gnanon, 2022a; Sahoo and Dash, 2017).

By means of the two-step system generalized method of moments, the empirical analysis has established several findings. The duration of the GATT/WTO membership exerts a positive effect on commercial services exports, including both modern and traditional services exports in the full

sample. Article XII Members enjoyed a higher positive effect of the membership duration on traditional service exports than Non-Article XII Members. The effect of the membership duration on commercial services exports tends to vary across countries in the full sample: the membership duration enhances traditional services exports at the detriment of modern services exports in low-income countries, but promotes modern services exports at the expense of traditional services exports in relatively wealthier countries.

The rest of the paper is organized as follows. Section 2 provides a theoretical discussion on the effect of the membership in the GATT/WTO on commercial services exports. Section 3 presents the empirical strategy, including the model specification, a brief data analysis, and the estimation strategy. Section 4 interprets empirical outcomes, and Section 5 concludes.

2. Theoretical background concerning the effect of the duration of GATT/WTO membership on services exports

As noted above, Gnanon (2022a) has recently investigated the effect of the WTO membership on services exports. The present section builds on the theoretical discussion by Gnanon (2022a) to elaborate on the effect of the duration of the GATT/WTO membership on commercial services exports.

At the outset, it is worth explaining why the analysis focuses on the services exports of the duration of GATT/WTO membership and not on the mere effect of WTO membership on services exports (as in Gnanon, 2022a). First, the duration of the GATT/WTO membership encapsulates both the membership in the GATT/WTO and the time spent by a state as a member of the GATT/WTO. Second, trade policies applied to goods were subject to a multilateral surveillance by GATT parties during the GATT era (e.g., Ghosh, 2010; Qureshi, 1990). Likewise, WTO Members' trade policies applied to goods and services are subject to a regular scrutiny by their peers under the WTO's Trade Policy Review Mechanism⁵ (e.g., Ghosh, 2010; Laird, 1990; Marceau and Garg, 2021). Thus, one could expect that the multilateral surveillance of trade policies in the GATT and WTO has helped Members improve their trade regimes over time (as their membership duration increases).

We postulate two channels through which the duration of membership in the GATT and WTO can affect services exports. The first channel is the expansion of merchandise exports, which in turn could boost services exports. The second channel is the liberalization of services trade policies under GATS (i.e., the WTO only), which by reducing the uncertainty faced by services trading firms, can also directly affect services exports.

2.1. Effect of the duration of GATT/WTO membership on services exports through goods exports

Dutt (2020) has obtained a strong positive effect of the GATT/WTO membership on bilateral trade, with this effect increasing almost monotonically with years of membership. In light of this finding, we can expect that the duration of the GATT/WTO membership exerts a strong positive effects on merchandise exports. On the other hand, some studies have pointed out the positive effects of goods exports on services exports (e.g., Ceglowski, 2006; Deardorff, 2001;

⁵ Information on the WTO's role of overseeing national trade policies is available online at: https://www.wto.org/english/tratop_e/tp_r_e/tp_int_e.htm

Eichengreen and Gupta, 2013a; Gnanon, 2021b; Gnanon and Priyadarshi, 2016; Karmali and Sudarsan, 2008; Kimura and Lee, 2006; Sahoo and Dash, 2017). One important argument concerning the positive effect of goods exports on services exports is the one developed by Eichengreen and Gupta (2013a). The assumption stipulates that countries that improve their penetration in goods markets (including through higher exports) would be able to develop a network on these markets that could, in turn, be used to expand their exports of services 'products'. This assumption is referred to as the 'network effect' of goods exports on services exports. Eichengreen and Gupta (2013a) have provided supported for this argument. This argument was also supported by empirical works such as those of Sahoo and Dash (2014, 2017), Gnanon (2021b) and Gnanon and Priyadarshi (2016). Overall, as countries spend more years as Members of the GATT/WTO, they enjoy higher merchandise exports. On the other hand, countries' improvement in the penetration of goods markets through higher merchandise exports would enhance the export of services items.

2.2. Effect of the duration of WTO membership on services exports through services trade policy liberalization

We now discuss the effect of the duration of GATT/WTO membership on services exports through the channel of services trade policies liberalization. As noted above, the GATT did not cover services matters. While countries might have unilaterally liberalized their services trade policies during the GATT period, or through the participation in regional trade agreements since the creation of the WTO, they have undertaken multilateral commitments under the GATS to open-up many services sectors to trade.

The GATS has not provided a specific definition of the noun "services", but has categorized the different types of services trade (most of which are intangible) into four modes (see Article I:2 of the GATS⁶). These include mode 1 (cross-border supply of services), mode 2 (consumption abroad), mode 3 (commercial presence), and mode 4 (presence of natural persons). The provisions in the GATS apply to all services, except for services provided in the exercise of governmental authority and the bulk of air transport services (although the latter exclusion is subject to review) (WTO, 2019).

The economic theory has provided many arguments in support for international cooperation on services trade policies (e.g., Copeland and Mattoo, 2008; Hoekman et al., 2007; WTO, 2019). First, services trade agreements provide a lock-in mechanism for signatory countries, given that the reneging of their commitments under these agreements entails significant costs for these countries. These multilateral commitments helps overcome the resistance of the domestic protectionist interest groups to the opening-up of the domestic services markets. Signing a multilateral trade agreement involves binding policies, which reduces the risk of raising arbitrarily trade barriers, and enhances the credibility and predictability of trading conditions (e.g., Limão and Maggi, 2015; Maggi and Rodriguez-Clare, 1998). Even though governments can have some room for manoeuvre to partially reverse reforms when binding commitments are less than actual regimes, such commitments still have the advantage of eliminating the risk of extreme policy reversals. In the scenario where services regimes are fully liberalized, and where there is no need for exporting firms to lobby for protectionist measures, states can still have a great interest in

⁶ See online at: https://www.wto.org/english/docs_e/legal_e/26-gats.pdf

investing in negotiating the binding of the status quo at the WTO (i.e., to lock in existing levels of openness) (Hoekman et al., 2007).

Several studies have shown that the bindings of commitments under the GATS have helped significantly boost services exports (e.g., Ciuriak and Lysenko, 2016; Ciuriak et al., 2020; Lamprecht and Miroudot, 2018; OECD, 2017). For example, Ciuriak and Lysenko (2016) have obtained that liberalizing services markets to levels higher than the binding pre-existing services policies in WTO commitments would help significantly expand services exports. Likewise, legal commitments to binding trade agreements to existing levels of services openness reduces the uncertainty faced by services trading firms and exerts a positive effect on bilateral trade volumes (OECD, 2017). Lamprecht and Miroudot (2018) have shown that increasing the average policy bindings under the WTO to the bound levels in regional trade agreements, without any actual new opening, has resulted in a rise in services trade flows between 8 per cent and 12 per cent, depending on the sector. Ciuriak et al. (2020) have demonstrated empirically that a greater reduction of the existing water in binding commitments under the GATS (i.e., the difference between countries' commitments under the GATS and their applied market access levels) by moving to commitments under free trade agreements contributes to significantly reducing the uncertainty for services traders and leading to a 4.7% increase in services trade.

The GATS provides that WTO Members should fulfil few obligations, which are the most-favoured-nation (MFN) treatment, transparency, and the review of administrative decisions (WTO, 2019). According to the MFN obligation (see GATS Article II), all foreign services and service suppliers should be substantially treated in the same way (see GATS Article II:1). The 'transparency' obligation provides that all generally applicable services measures pertaining to the GATS should be promptly publish (see GATS Article III). The rules on review of administrative decisions require "*members to maintain tribunals or procedures that enable foreign suppliers to seek review of, and redress for, administrative decisions affecting trade in services.*" (see WTO, 2019, Box E.2, p158). Notwithstanding this, Members are permitted under the GATS to adopt measures that derogate from the MFN obligation. Such measures may aim to protect a preferential treatment granted to one or several trading partners, or to continue enforcing reciprocity requirements. To ensure transparency in services trade policies, facilitate decision-making, and reduce uncertainty for services trading firms, Members have to notify to the WTO Council for Trade in Services any new or changed measures. The compliance with the GATS obligations involves for each WTO Member to have a Schedule of Specific Commitments⁷, which determines the extent to which it provides for market access and national treatment and any limitations that may be attached, across different services sectors and modes of supply. In this Schedule of Specific Commitments, Members bind the specified level of market access and national treatment, and commit not to impose any new measures that would result in a restriction of entry into the market or the operation of the service. These commitments enhance transparency and predictability of the trading environment for trading firms, and significantly limit the risk of policy reversals that would result in greater protectionism (WTO, 2019).

The literature has shown, however, that WTO Members' current commitments under the GATS⁸ do not guarantee the current applied level of openness of services trade policies (e.g., Borchert et al., 2011; WTO, 2019). A recent analysis has been performed by WTO (2019) on WTO

⁷ See information online at: https://www.wto.org/english/tratop_e/serv_e/gatsqa_e.htm

⁸ These commitments are in most cases over 20 years old (WTO, 2019).

Members' commitments under the GATS for market access and national treatment, in particular the sectoral scope of their commitments (the number or proportion of sectors in which guarantees have been contracted) (see WTO, 2019, pages 167-169). The analysis has relied on the recent available data (as of May 2019), and shown that for the majority of WTO Members, commitments do not cover the majority of services sectors (as just over one-third of all services sub-sectors are covered by commitments). While developed countries have the highest sectoral coverage (66 per cent), the sectoral coverage of developing countries was 28 per cent, and least developed countries among developing countries have a lower sectoral coverage of commitments (of 21 per cent). Importantly, WTO Article XII Members⁹ undertook higher commitments than original WTO Members, including in a number of sectors similar to that of developed countries. As underlined in section 1, Article XII Members are WTO Members that acceded to the WTO under rigorous procedures (more rigorous than the ones underwent by original WTO Members in the GATT), that involved significant domestic reforms, essentially due to the increased scope and coverage of the WTO agreements (e.g., Drabek and Bacchetta, 2004; Lanoszka, 2001). The WTO (2019)'s analysis has also examined the schedules of 31 acceded members, and found that Article XII Members' commitments to openness of services sectors to trade was far larger than the ones of original WTO members. In particular, Article XII Members' commitments cover a wider range of subsectors and a relatively higher number of full bindings, without market access or national treatment limitations. Moreover, the majority of WTO Members undertook commitments on some services sectors such as tourism, financial, and telecommunication services, but fewer commitments on other sectors, such as transport, distribution, postal-courier, environmental or audio-visual services. Meanwhile, the overwhelming majority of Article XII Members undertook commitments in most services sector groups.

Both the Council for Trade in Services (under the guidance of the WTO General Council) and the WTO's Trade Policy Review Mechanism ensure that Members comply with their GATS obligations and commitments. Thus, one could expect that as their WTO membership duration increases, member states will comply with their GATS commitments (and eventually undertake greater commitments), and improve their services trade regime. Furthermore, the membership in the GATT/WTO allows member states to share knowledge concerning best trade policies and practices in regulating services sectors in a manner that restricts trade the least (WTO, 2019: p 164). This could ultimately contribute to enhancing countries services exports.

2.3. Hypotheses to be tested

On the basis of the discussion in sections 2.1 and 2.2, we expect that the duration of WTO membership would likely increase Members' commercial services exports (*hypothesis 1*). However, the magnitude of this positive effect of the GATT/WTO membership duration on services exports may not be same across all countries, and particularly in Article XII Members and Non-Article XII Members. On the one hand, if we were to rely only on the above-mentioned argument concerning the network effect of goods exports on services exports, we could argue that Non-Article XII Members could enjoy a higher positive effect of the duration of GATT/WTO membership on services exports than Article XII Members, as they expand their network in the

⁹Information on Article XII members could be found online at: https://www.wto.org/english/docs_e/legal_e/04-wto.pdf and https://www.wto.org/english/thewto_e/acc_e/acces_e.htm

goods markets. At the same time, as Article XII Members undertook greater GATS commitments (including in modern services sectors) than Non-Article XII Members, one may expect that they would enjoy higher commercial services exports (eventually modern services exports) than Non-Article XII Members. This would particularly be the case for Article XII Members that had been able to secure a higher penetration in the goods markets than Non-Article XII Members. It is important to point out here that the only opening-up of domestic services markets to trade might not be sufficient to boost commercial services exports, as other factors (such as the development level, human capital, access to finance, and technological development) could be at play. Thus, the mere greater GATS commitments by Article XII Members compared to Non-Article XII Members might not necessarily result in greater services exports by the former than the latter. Overall, the effects of the duration of GATT/WTO membership on commercial services exports (including modern and traditional services exports) on Article XII Members can be positive or negative. Therefore, it is an empirical matter (***hypothesis 2***).

Moreover, we can expect that longstanding GATT/WTO Members, in particular those with a higher real per capita income would experience higher services exports than relatively new Members, and even more so than those with a relatively lower real per capita income (***hypothesis 3***). The rationale for this is that relatively wealthier longstanding GATT/WTO Members are likely to have a higher capacity (in terms of financial resources, human capital, and institutions) to expand their services exports (including through the 'network channel' in the goods markets) than relatively new GATT/WTO Members, notably those that are less wealth among them.

On another note, building on the argument concerning the 'network effect of goods exports on services exports' developed in section 2.1, we argue that as time passes, longstanding GATT/WTO Members, including Non-Article XII Members might have established a larger network in the goods markets than relatively new GATT/WTO Members, notably Article XII Members. Thus, the duration of the GATT/WTO membership would exert a positive effect on commercial services exports as countries' penetration in goods markets improves. Additionally, the magnitude of this positive services exports effect of the membership duration is likely to be larger, the greater is a country's penetration in goods markets (***hypothesis 4***).

3. Empirical strategy

This section presents the empirical model (sub-section 3.1), data on key variables of interest in the analysis (sub-section 3.2), and the econometric estimator (sub-section 3.3.).

3.1. Model specification

To investigate empirically the effect of the duration of the GATT/WTO membership on services exports, we postulate a baseline model that draws from the existing works on the macroeconomic¹⁰ determinants of services exports (e.g., Clarke, 2008; Freund and Weinhold, 2002; Eichengreen and Gupta, 2013a,b; Kimura and Lee, 2006; Goswami et al., 2012; Sahoo and Daho, 2014, 2017).

¹⁰ Other studies such as Fernandes et al., (2019) and Sun (2021) have used firm-level data in their analyses of the determinants of services exports.

The baseline model specification is as follows:

$$\begin{aligned} \text{Log}(\text{SEXP})_{it} = & \alpha_1 \text{Log}(\text{SEXP})_{it-1} + \alpha_2 \text{DUR}_{it} + \alpha_3 \text{Log}(\text{GDPC})_{it} + \alpha_4 \text{FTR}_{it} + \\ & \alpha_5 \text{Log}(\text{REER})_{it} + \alpha_6 \text{Log}(\text{POP})_{it} + \gamma_t + \mu_i + \omega_{it} \end{aligned} \quad (1)$$

where i stands for a given country; and t denotes a year. Based on the data available, we have constructed an unbalanced panel dataset of 128 developing countries over the annual period from 2008 to 2019. It is worth noting that following previous studies such as Gnanngnon (2022a), Brotto et al. (2021), and Tang and Wei (2009), we have excluded developed countries from the analysis. The WTO provides no definitions of “developed” and “developing” countries. When joining the WTO, a member state self-designates itself either as a “developing country” or a “developed country”, although other members can challenge a member's decision to opt for the ‘developing country’ status in order to take advantage of provisions available to developing countries. In the present analysis, we have considered the so-called “old-industrial countries” as developed countries that have been excluded from the analysis.

The full sample of the 128 countries contains 29 Article XII Members and 99 Non-Article XII Members.

The dependent variable “SEXP” is the indicator of commercial services exports. It can be the share of total commercial services exports in GDP (denoted “CSE”). In addition, the latter has been decomposed into the share of modern commercial services exports in GDP (denoted “MSE”) and the share of traditional commercial services exports in GDP (denoted “TSE”). Note that the indicators “CSE”, “MSE” and “TSE” are not expressed in percentage, as they have been logged (using the natural logarithm) to reduce their skewed distributions.

Drawing from previous works (e.g., Eichengreen and Gupta, 2013b; Gnanngnon, 2022a; Sahoo and Dash, 2014; 2017) on the determinants of commercial services exports, we have included in the category of modern services exports the following major sub-sectors: ‘Insurance and pension services’; ‘Financial services’; ‘Telecommunications, computer, and information services’; ‘Charges for the use of intellectual property n.i.e.’; and ‘Other business services’. The category of ‘traditional services’ includes the following major sub-sectors: ‘goods-related services (i.e., manufacturing services on physical inputs owned by others and Maintenance and repair services)’; ‘Transport’; ‘Travel’; ‘Construction’; and ‘Personal, cultural, and recreational services’.

The one-year lag of the dependent variable has been introduced in model (1) in order to capture the strong persistence of this variable over time. Its introduction in model (1) also helps address the omitted variable problem.

α_1 to α_6 are parameters that will be estimated. μ_i represent countries’ unobserved time-invariant characteristics, notably fixed effects, that could affect services exports. γ_t represent global shocks that affect countries’ commercial services exports. ω_{it} is an error term.

The variable “DUR” is the transformed indicator of a country’s duration of membership in GATT and WTO. Let us denote “DUR1” a given country’s duration of GATT/WTO membership. It represents the time elapsed since the country has joined either the GATT or the WTO (specifically for Article XII Members). This variable takes the value of “0” for years during which the country was not a GATT or WTO Member. It takes the value of “1” the first year the country joined the GATT or WTO (i.e., the year it acceded to the GATT or WTO), and is

incremented by 1 for every subsequent (additional) year spent as GATT/WTO member. As the GATT entered into effect in 1948, this variable takes the value of 1 for countries that joined the GATT in 1948, and the value of "DUR1" is 72 in 2019. For the other countries that were GATT Members before joining the WTO, the variable "DUR1" took the value of 1 for the first year of the GATT membership, and is incremented by 1 for every additional year until 2019. For states that were not GATT Members but joined the WTO (under WTO's Article XII), the variable "DUR1" took the value of 1 for the first year of WTO membership, and is incremented for every additional year until 2019. As the variable "DUR1" contains many zeros, and has a skewed distribution, it has been transformed using the following formula (see Yeyati et al. 2007): $DUR = \text{sign}(DUR1) * \log(1 + |DUR1|)$, where $|DUR1|$ refers to the absolute value of the variable "DUR1".

Appendix 1 describes all variables used in the analysis. Appendix 2 displays the list of countries contained in the full sample (including Article XII Members, Non-Article XII Members, and non-WTO Members) as well as the duration of the membership in the GATT/WTO as at 2019 (the last year of the period under analysis). Appendices 3a, 3b and 3c report standard descriptive statistics on the variables used in the analysis, including over the full sample, and the sub-samples of Article XII Members, and Non-Article XII Members. Countries whose duration of membership in the GATT/WTO was equal to zero in 2019, were those that were either a WTO Observer (i.e., these countries are in the process of acceding to the WTO) or had not applied for the membership in the WTO.

The control variables "GDPC", "REER" and "POP" are respectively the real per capita income, the real effective exchange rate, and the population size. The natural logarithm has been applied to each of these variables to reduce their skewed distribution.

The real per capita income represents countries' development level, and reflects the economies of scale in a country (e.g., Li et al., 2005; Nyahoho, 2010). Higher economies of scale are likely to be associated with a higher domestic demand for services 'products', and eventually with higher services exports. On another note, an increase in the population size can lead to a higher demand for services by final consumers, and an expansion of the services sector (e.g., Goswami et al 2012). It is, however, not clear whether this expansion of services sector would result in an expansion of services exports (in addition to the sales of services 'products' in the domestic market).

The variable measuring the real exchange rate has been introduced in the model because Eichengreen and Gupta (2013b) have shown that a depreciation of the real exchange rate promotes services exports (notably modern services exports), and to a greater extent than it does for goods exports. Therefore, we expect that a depreciation of the real exchange rate would lead to higher commercial services exports. An increase in the values of the indicator of the real effective exchange rate indicates an appreciation of the real effective exchange rate.

The variable "FTR" is the frontier technology readiness index. It reflects a country's technological capacities related to physical investment, human capital and technological effort. It measures the country's capacities to use, adopt and adapt these technologies. It has been constructed on the basis of five indicators that measure a country's capacity to use, adopt and adapt frontier technologies, and using the principal components analysis. These five indicators are the deployment of information and communications technology (ICT), skills, Research and Development activity, industry activity and access to finance (see UNCTAD, 2021). The FTR

index has been obtained by using the principal components analysis applied to these five indicators. Its values range between 0 and 1, with values closer to 1 indicating a country's readiness to use and adopt frontier technologies. In contrast, values of this index closer to 0 show that a country is less ready for the use and adoption of frontier technologies.

We expect that countries with greater capacities to use, adopt and adapt technologies are likely to enjoy higher services exports than those with lower capacities. For example, the development of technological tools, for example, a higher Internet penetration influences positively commercial services exports (e.g., Clarke, 2008; Freund and Weinhold, 2002; Goswami et al., 2012; Mishra et al., 2020; Sahoo and Dash, 2017). Human capital accumulation is essential for promoting services exports (e.g., Goswami et al., 2012; Sahoo and Dash, 2017). Similarly, access to finance, including trade finance helps trading firms overcome fixed and variable trade costs (e.g., Auboin and Engemann, 2014; Chaney, 2016; Leibovici, 2021). In addition to the potential positive effect of countries' frontier technology readiness on commercial services exports, one could also expect that the duration of GATT/WTO membership would exert a higher positive effect on commercial services exports in countries that have greater capacities to use, adopt and adapt these technologies than those that have relatively lower capacities to use, adopt and adapt these technologies.

3.2. Data analysis

We first note from Appendices 3a, 3b and 3c that the duration of the GATT/WTO membership over the full sample ranges from 0 to 72, with a mean of 30.75 and a standard deviation amounting to 21.26 (see Appendix 3a). However, these statistics hide the fact that among Article XII Members, this duration ranges from 0 to 24, with an average value of 11.46 and a standard deviation of 6.44. Among Non-Article XII Members, the values of the duration of the GATT/WTO membership range from 0 to 72, with an average of 36.42, and a standard deviation of 20.76.

We get a first glimpse of the relationship between the duration of the GATT/WTO membership and commercial services exports by performing the Kruskal-Wallis test (Kruskal and Wallis, 1952) on whether commercial services exports indicators are equally distributed regardless of the duration of the GATT/WTO membership. This test is a non-parametric test similar to the one-way analysis of variance, and allows comparing the distribution of outcomes among three or more independent (unmatched) groups. The null hypothesis of the test is the equality of the distribution of an outcome among the different groups that are being tested. It is rejected when the p-value of the Chi-squared statistic (arising from this test) is lower than 10%, at the 10% level. We implement the test for each of the above-mentioned three services exports indicators, and over the full sample and the sub-samples of Article XII Members and Non-Article XII Members. The outcomes of the test are presented in Table 1.

We note from that Table that concerning the full sample, the p-values related to the Chi-Squared statistics are all lower than 0.01, thereby suggesting that at the 1% level, the distributions of each of the services export indicators are not identical for various durations of the membership in the GATT/WTO. The same conclusion applies to the sub-sample of Article XII Members, given that for these countries, the p-values related to the Chi-Squared statistics are also all lower than 0.01. In contrast, for the sub-sample of Non-Article XII Members, the p-values of the Chi-square statistics are all higher than 0.10. These results seem to indicate that for Non-Article XII

Members, the distribution of each services export indicator is the same for varying durations of the GATT/WTO membership.

Based on these outcomes of the Kruskal-Wallis test, one could argue that while the duration of the GATT/WTO membership matters for commercial services exports by Article XII Members, it does not seem to be the case for Non-Article XII Members. Nonetheless, as each of these two groups of member states is heterogenous in terms of development level, these outcomes may hide various outcomes if we considered sub-groups of each of these groups. As we are primarily interested in the effect of the duration of the GATT/WTO membership on commercial services exports by Article XII Members and Non-Article XII Members, we do not go here into a deeper analysis, leaving the empirical analysis to examine the causal effect of the duration of the GATT/WTO membership on commercial services exports.

We get a further insight into the relationship between the duration of the GATT/WTO membership and commercial services exports by comparing the development of the indicators of commercial services exports in Article XII Members and Non-Article XII Members. Figure 1 presents the development of the share of total commercial services exports in GDP over Article XII Members and Non-Article XII Members. Figure 2 displays the development of the share of modern services exports in GDP and the share of traditional services exports in GDP, over Article XII Members and Non-Article XII Members. In addition, we provide in Figures 3 and 4 the correlation patterns in the form of scatter plot between the three services export indicators and the duration of the GATT/WTO membership, respectively over Article XII Members and Non-Article XII Members.

Figure 1 indicates upward movements of the share of total commercial services exports in GDP for both Article XII Members and Non-Article XII Members. However, over the full period, the share of total commercial services exports in GDP was higher for Article XII Members than for Non-Article XII Members, although this may hide differences across countries in each of these two groups. The share of total commercial services exports in GDP moved from 11.3% in 2008 to 13.7% in 2019 in Article XII Members, while for Non-Article XII Members, it moved from 10.8% in 2008 to 12.4% in 2019.

Figure 2 suggests that the share of modern services exports in GDP was lower for Article XII Members than for Non-Article XII Members, while Article XII Members experienced a higher share of traditional services exports in GDP than Non-Article XII Members. Especially, the share of modern services exports by Article XII Members increased steadily from 2% in 2008 to 3.5% in 2019, while for Non-Article XII Members, it yet fluctuated, but moved from 3.3% in 2008 to 3.5% in 2019. The share of traditional services exports tended to increase over time in both Article XII and Non-Article XII Members. In 2008, it was 9.1% for Article XII Members (against 7.2% for Non-Article XII Members), while in 2019, it reached 11.2% for Article XII Members, and 9% in Non-Article XII Members.

We note from Figure 3 that each of the three services export indicators is (strongly) positively correlated with the duration of membership in GATT/WTO in Article XII Members. For Non-Article XII Members, the correlation pattern between the duration of GATT/WTO membership and the share of modern services exports in GDP is positive. However, for the two other services export indicators, we observe weak negative correlation patterns with the duration of GATT/WTO membership.

3.3. Estimation strategy

At the outset, we would like to note that in the empirical analysis, and unless otherwise stated, all regressions are performed using each of the three commercial services export indicators described in section 2.1.

We commence the empirical exercise by estimating model (1) using the pooled ordinary least squares (POLS), where standard errors of estimates are corrected using the approach of Driscoll and Kraay (1998). This approach handles the autocorrelation, heteroscedasticity, and any form of cross-sectional dependence in the error-term. The estimation has been performed over the full sample, as well as over Article XII Members, and Non-Article XII Members. The results of this estimation are provided in Table 2.

The well-known main problem with the use of this estimator in dynamic panel datasets featured by a large cross-section dimension and a small time dimension is the bias introduced by the presence of the lagged dependent variable as a regressor, i.e., the so-called Nickell bias (Nickell, 1981). Notwithstanding this, estimates obtained from the use of the POLS estimator could be compared with other estimates, notably the ones arising from the regressions based on the two-step system generalized method of moments (GMM) estimator proposed by Blundell and Bond (1998). In fact, the two-step system GMM estimator is the primary approach utilized to perform the empirical analysis in the present study, as it is suitable for dynamic panel datasets with a large cross-sectional dimension and a small time-period. This approach helps handle several endogeneity concerns, of which the Nickell bias, and the bi-directional causality between the dependent variable and regressors. It is particularly appropriate when series display a strong persistence over time (e.g., Alonso-Borrego and Arellano, 1999), and is, in this context, asymptotically more efficient than the difference GMM estimator proposed by Arellano and Bond (1991). The use of the two-step system GMM estimator entails estimating a system of equations that combines an equation in differences and an equation in levels. In this system of equations, lagged first differences are used as instruments for the levels equation, and lagged levels are used as instruments for the first-difference equation.

The appropriateness of the two-step system GMM estimator (i.e., the correctness of the model specifications estimated) is assessed using three standard statistical tests. These are the Arellano-Bond test of the presence of first-order serial correlation in the first-differenced error term (AR (1¹¹)); the Arellano-Bond test of absence of second-order autocorrelation in the first-differenced error term (denoted AR (2¹²)) and the Hansen/Sargan test of over-identifying restrictions (OID¹³). We additionally report the outcomes of the Arellano-Bond test of absence of third-order autocorrelation in the first-differenced error term (denoted AR (3)). While not required, a p-value of the statistic arising from this test higher than 0.10 at the 10% level) could signal that the model specification does not suffer from an omitted variable problem. To avert the proliferation of instruments in the regressions, we follow the recommendation by Roodman (2009) and make sure that the number of instruments is lower than the number of countries in the sample. To that effect, we cap the number of instruments to 2.

In the regressions, we have treated the variables capturing the duration of GATT/WTO membership and the frontier technology readiness as endogenous. The rationale for treating the

¹¹ For this test, it is expected that the p-value of the relevant statistic will be lower than 0.10 at the 10% level.

¹² For this test, it is expected that the p-value of the relevant statistic will be higher than 0.10 at the 10% level.

¹³ The p-value of the statistic related to this test should be higher than 0.10, at the 10% level.

indicator of membership duration as endogenous is that while we expected the duration of GATT/WTO membership to affect commercial services exports, it is also reasonable to envisage that states that are not members of the GATT/WTO, but that are aware of the benefits for their economies of joining the organization (for example in terms of promoting economic growth and development through jobs creation and improvement of welfare) would seek for earlier membership in the GATT/WTO. Hence, the reverse causality from the dependent variable to the indicator of membership duration. Likewise, member states that wish to encourage trading firms' services exports may implement the requisite policies to improve their capacity to use, adopt and adapt frontier technologies. Hence, the reverse causality from the services exports indicator to the indicator that captures countries' frontier technology readiness.

While the real exchange rate indicator could also be considered as endogenous, we have treated as exogenous for the following reasons. We performed regressions that considered the real exchange rate indicator as endogenous, and as exogenous. When compared these two regressions, we noticed that the coefficient of our variable of interest (which is the duration of membership in the GATT/WTO) did not change, nor did the sign of the indicator of the real exchange rate change (although the magnitude of its coefficient changed slightly). At the same time, when the real exchange rate was considered as endogenous, instruments proliferated significantly such that the number of instruments was higher than the number of countries, thereby leading endogenous variables to overfit (Roodman, 2009). Against this background, we opt for treating the real exchange rate indicator as exogenous in all regressions based on the two-step system GMM estimator. This approach allows obtaining reasonable statistics tests (concerning the validity of the GMM approach), while concurrently ensuring that the number of instruments is kept lower than the number of countries in the regressions.

The empirical exercise based on the two-step system GMM estimator proceeds as follows.

Table 3 reports the outcomes of the estimation of model (1). These outcomes allow, *inter alia*, testing hypothesis 1.

Table 4 contains estimates that allow testing the robustness of the findings in Table 2. This robustness check is performed by using an alternative indicator of services exports, which is a country's performance in terms of commercial services exports relatively to the world's performance in terms of commercial services exports. In reference to Okafor and Teo (2019: p3457), we compute a country's performance in terms of services exports relatively to the world as the ratio of the country' share of services exports (in GDP) to the world's share of services exports (in the world GDP). For example, a country's performance in terms of total commercial services exports relatively to the world is denoted "CSEPERF" and computed as follows $CSEPERF_{it} = \frac{CSE_{it}}{CSEW_{it}}$, where the variable "CSE_{it}" is a country's share of total commercial services in GDP, and "CSEW_{it}" is the ratio of the world total commercial services exports to the world GDP. Note that for the sake of the analysis, this variable is not expressed in percentage. The same procedure has been applied to compute the indicator of performance in terms of modern services exports relatively to the world (denoted "MSEPERF"), and the indicator of performance in terms of traditional services exports relatively to the world (denoted "TSEPERF") (see Appendix 1 for details on the computation of this indicator). It is worth noting that we used two lags of the dependent variable (i.e., "CSEPERF", "MSEPERF", and "TSEPERF") in order to meet the requirements for the validity of the two-step system GMM approach.

Results in Table 5 allow assessing whether modern services exports (as a share of GDP) are complementary with traditional services exports (as a share of GDP), and in particular whether countries tend to substitute modern services exports with traditional services exports, as their duration of membership in the GATT/WTO increases. In column [1] of this Table, we report the outcomes of the estimation of model (1) that contains the variable "TSE" as regressor, and where the dependent variable is "MSE", the objective being to examine how traditional services exports affect modern services exports. Column [2] of the same Table contains outcomes of the estimation of model (1) that contains the variable "MSE" as regressor, and where the dependent variable is "TSE", the objective being to examine how modern services exports affect traditional services exports. Column [3] of the Table reports estimates that help explore how the duration of membership in the GATT/WTO affects traditional services exports as countries endeavour to increase their modern services exports. The specification of model (1) that allows obtaining these outcomes is model (1) where the dependent variable is "TSE", and in which we introduce both the variable "MSE" along with its interaction with the variable "DUR".

Table 6 contains several estimations' results. The first set of outcomes (see lines 1 and 2 of Table 6) allow testing hypothesis 2 by exploring the effect of the duration of GATT/WTO membership on commercial services exports in Article XII Members versus Non-Article XII Members. In view of the small number of Article XII Members (25) in the full sample, it is not possible to run regressions separately for Article XII Members and Non-Article XII Members, using the two-step system GMM technique. This is why to obtain the outcomes that allow exploring the effect of the duration of GATT/WTO membership on commercial services exports in Article XII Members versus Non-Article XII Members, we estimate a specification of model (1) that contains a dummy variable for Article XII Members (denoted "ARTXII") and its interaction with the variable "DUR".

The second set of outcomes reported in Table 6 (see lines 3 to 5) permits to investigate whether the effect of the duration of membership in the GATT/WTO on commercial services exports is conditioned on countries' real per capita income in the full sample. In this regard, these results allow testing hypothesis 3. These outcomes are obtained by estimating a specification of model (1) that contains the interaction between the indicator "DUR" and the real per capita income indicator.

The third set of estimates provided in Table 6 (see lines 9 to 10) helps obtain the effect of the duration of GATT/WTO membership on commercial services exports in the full sample conditioned on the level of frontier technology readiness. As noted in section 3.1, we expect that the duration of GATT/WTO membership would exert a higher positive effect on commercial services exports in countries that have greater capacities to use, adopt and adapt these technologies than those that have relatively lower capacities to use, adopt and adapt these technologies. These outcomes are obtained by estimating a specification of model (1) that includes the interaction variable between the indicators "DUR" and "FTR".

The fourth set of outcomes presented in Table 6 (see lines 11 to 16) allows testing hypothesis 4, i.e., whether the effect of the duration of GATT/WTO membership on commercial services exports in the full sample works through the channel of the 'network established in the goods markets', i.e., countries' penetration in the goods markets. This hypothesis is tested by estimating another variant of model (1), which is nothing else than model (1) in which we introduce the interaction between the indicator of countries' penetration in the goods markets and the variable

"DUR". We use two indicators of countries' penetration in the goods markets. The first one is the share (not expressed in percentage) of total merchandise exports in GDP, and denoted "MERCH". As the latter includes all types of merchandises exported (of primary goods, and manufacturing goods with different technological and skill intensity), it could be useful to test whether countries that export sophisticated goods secure higher services exports (eventually higher modern services exports) than those that export less sophisticated goods, notably primary exports. The importance of considering an indicator that captures sophisticated exports also rests on the finding in the literature that greater economic complexity is associated with a higher level of services export diversification (Gnangnon, 2022b). Against this background, we use the index of economic complexity as a second indicator of countries' penetration in goods markets. The current stage of a country's production knowledge, or the knowledge materialized in the production system provides a strong indication of the level of complexity of this economy (e.g., Hausmann and Hidalgo, 2009; Hausmann et al., 2014; Mishra et al., 2020). Economic complexity, therefore, reflects the diversity and ubiquity of a country's export structure. A country with a low ubiquity of products exported is the one whose export products cannot be easily reproduced by other countries, given that the production of these goods requires a set of exclusive capabilities (e.g., Hausmann and Hidalgo, 2009; Hausmann et al., 2014; Mishra et al., 2020). The indicator of economic complexity used in the present analysis is denoted "ECI", and has been constructed using data that connect countries to the exported products, and by applying the methodology described in Hausmann and Hidalgo (2009). Higher values of this indicator reflect greater economic complexity (see Appendix 1 for further details).

4. Interpretation of empirical results

For the sake of simplicity, in this section, we use the expression "membership duration" to mean "the duration of the GATT/WTO membership". Moreover, the expression "commercial services exports" refers to "the share (not in percentage) of total commercial services exports in GDP". The expressions "modern services exports" and "traditional services exports" refer respectively to "the share (not in percentage) of modern services exports", and the "the share (not in percentage) of traditional services exports".

We note from all Tables that the coefficients of the one-year lag of the dependent variable (and the coefficients of the two-year lag of the dependent variable in Table 4) are positive and significant at then 1% level. This underlines the need for considering model (1) in a dynamic form, including with the lag of the dependent variable as a regressor.

Estimates reported in Table 2 (based on the POLS estimator) show that the membership duration exerts a negative and significant effect (at the 5% level) on traditional services exports over the full sample (see column [3]). At the same time, we obtain a positive and significant effect (at the 5% level) of the membership duration on modern services exports in Article XII Members (see column [5]), and a negative and significant effect (at the 5% level) of the membership duration on traditional services exports in Non-Article XII Members (see column [5]). In the other columns of Table 2, there is no significant effect of the membership duration on commercial services export indicators. Concerning the control variables, we notice that countries' capacities to use, adopt and adapt frontier technologies influence only significantly (at the 1% level) modern services exports (the effect is positive) in the full sample. However, for Article XII Members, the frontier technology readiness affects positively and significantly (at the 1% level) total commercial services

exports, including modern services exports and traditional services exports. For Non-Article XII Members, the capacity to use, adopt and adapt frontier technologies exerts a significant (at the 1% level) effect only on modern services exports (this effect is positive). The real per capita income appears to exert no significant effect on commercial services exports across all columns of Table 2, while the population size tends to influence negatively and significantly all commercial services exports indicators over the full sample, and in particular over Article XII Members. For Non-Article XII Members, the services exports effects of the population size is statistically significant at the conventional significance levels only on modern services exports (this effect is negative). Finally, the appreciation of the real exchange rate reduces commercial services exports in the full sample, and in Non-Article XII Members, but it exerts no significant effect on Article XII Members' commercial services.

We now turn to results presented in Tables 3 to 6. The outcomes of the statistical tests that help test the appropriateness of the two-step system GMM for performing the empirical analysis, are reported at the bottom of Tables 1 to 5. These results confirm that all specifications whose results are reported in these Tables are well specified¹⁴. Concerning Table 6, the full results of these different specifications of model (1) have not been reported in the present study in order to save space¹⁵. Against this backdrop, we conclude that the two-step system GMM estimator is appropriate for the empirical analysis.

Outcomes reported in Table 3 show that over the full sample, the membership duration exerts a positive and significant effect (at the 1% level) on total commercial services exports, and in particular on the two components of the latter, namely modern services exports, and traditional services exports. An additional year of the GATT/WTO membership (which signifies that the variable "DUR1" increases by 100%) is associated with an increase in total commercial services exports by 12 per cent, a rise in modern services exports by 11.2 per cent, and an increase in traditional services exports by 4.2 per cent. It, therefore, appears that the membership duration exerts a higher positive effect on modern services exports than on traditional services exports. These outcomes support hypothesis 1. We notice that these effects are quite different from the ones obtained in Table 2, especially in columns [1] to [3] of this Table.

Regarding control variables, we obtain that the real per capita income is negatively and significantly associated with total commercial services exports, and modern services exports, but affects positively traditional commercial services exports (although here, the effect is significant only at the 10% level). This may signify that as countries improve their real per capita income, they tend to export fewer modern services 'products', but more traditional services 'products'. These findings may also hide the fact that the effect of the membership duration on services exports across countries is conditioned on the real per capita income. We will test this later in the analysis. As expected, countries' capacities to use, adopt and adapt frontier technologies is positively and significantly associated with all three indicators of commercial services exports. The depreciation of the real exchange rate promotes total commercial services exports, including both modern and traditional services (the positive effect is larger on traditional services exports than on modern services exports). An increase in the population reduces commercial services exports, and notably

¹⁴ Note that all model specifications whose results are summarized in Table 6 are also well specified.

¹⁵ These results could be obtained upon request.

traditional services exports, and its negative effect on modern services exports is significant only at the 10% level.

Results of the control variables in Tables 4 to 6 align with those in Table 3.

Outcomes in Table 4 confirm the findings in Table 3, although with different estimates. We note that the membership duration exerts a positive and significant effect (at the 1% level) on total commercial services export performance relatively to the world, including on modern services export performance relatively to the world, and on traditional services export performance relatively to the world. Once again, the effect of the membership duration on traditional services export performance relatively to the world (the coefficient amounts to 0.073) is higher (slightly more than the double) than the one on modern services export performance relatively to the world (the coefficient amounts to 0.033).

Estimates presented in column [1] of Table 5 show that over the full sample, an increase in traditional services exports (by 100 per cent, i.e., doubling the share of traditional services exports in GDP) results in an increase in modern services exports by 20.8 per cent. Likewise, outcomes in column [2] of the same Table reveal that over the full sample, an increase in modern services exports by 100 per cent (i.e., doubling the share of modern commercial services in GDP) results in an increase in traditional services exports by 6.1 per cent. It, therefore, ensues that the development of traditional services exports stimulates more the development of modern services than the development of modern services encourages the promotion of traditional services. At the same time, results in column [3] of the same Table indicate that the coefficient of the variable "DUR" and the interaction term of the variable ["DUR*Log(MSE)"] are all negative and significant at the 1%. On the basis of these outcomes, we will be tempted to conclude the following over the full sample: as the membership duration increases, member states that increase traditional services exports tend to export less of modern services exports, and inversely those that export less of traditional services exports, tend to export more of modern services exports. Figure 5 displays at the 95 per cent confidence intervals, the marginal impact of the membership duration on modern services exports for varying shares of traditional services exports in GDP. This Figure suggests that the marginal impact of the membership duration on traditional services exports decreases as member states experience higher modern services exports. However, this marginal impact is not always statistically significant. It is not statistically significant for countries whose share of modern services in GDP¹⁶ range from 0.005 (i.e., 0.5%) to 0.047 (i.e., 4.7%). Member states whose share of modern services in GDP is lower than 0.5%, experience a positive and significant effect of the membership duration on traditional services exports. Member states whose share of modern services in GDP is higher than 4.7%, experience a negative and significant effect of the membership duration on traditional services exports. Summing-up, Figure 5 suggests that as the membership duration increases, member states that have a very low share of modern services exports in GDP tend to increase their export of traditional services items. In contrast, member states that have increased their modern services exports (as far as it is higher than 4.7%) tend to export fewer traditional services export items.

We now consider estimates presented in Table 6. Results in lines (1) and (2) suggest that the membership duration exerts a higher positive effect on total commercial services exports

¹⁶ As per Appendix 3a, the values of the indicator that captures the share of modern services in GDP (not in percentage) in the full sample range from 0.0001 to 0.79. In terms of percentage, the values of this indicator in the full sample range from 0.01% and 79%.

(including on traditional services exports) in Article XII Members than in Non-Article XII Members (see columns [1] and [3]). The net effects of the membership duration on total commercial exports for Article XII Members and Non-Article XII Members are positive and amount respectively to 0.072 ($= 0.0389 + 0.0332$) and 0.039. Thus, an additional year of the GATT/WTO membership leads to an increase in total commercial services exports by 7.2 per cent in Article XII Members, and by 3.9 per cent in Non-Article XII Members. For both Article XII Members and Non-Article XII Members, modern services exports increased by 8.15 per cent further to an additional year of the GATT/WTO membership. However, an additional year of the GATT/WTO membership resulted in an increase in traditional services exports by 0.031 or 3.1 per cent ($= -0.0283 + 0.0591$) in Article XII Members, and a fall in traditional exports by 2.8 per cent in Non-Article XII Members. These outcomes suggest that the membership duration has promoted to a greater extent, commercial services exports (including traditional services exports) in Article XII Members than in Non-Article XII Members. The two groups of Members experienced, however, an increase (of the same magnitude) in modern services exports, as their membership duration increased. In addition, for both groups of Members, the GATT/WTO Membership duration has exerted a larger positive effect on modern services exports than on traditional services exports.

We now turn to results in lines (3) to (5) of Table 6. Those reported in column [1] indicate that neither the coefficient of the variable "DUR" nor the interaction term associated with "[DUR*Log(GDPC)]" are significant at the conventional significance levels. Note that at the same time, the coefficient of the variable "Log(GDPC)" is negative and significant at the 1% level in columns [1] and [2], but positive and significant at the 5% level in column [3]. On the basis of these outcomes, we may be tempted to conclude that over the full sample, there is no significant effect of the membership duration on total commercial services exports at the conventional significance levels. However, these outcomes represent 'average' effects across countries in the full sample. To get a better picture on these impacts, we provide in Figure 6, at the 95 per cent confidence intervals, the marginal impact of the membership duration on total commercial services exports conditioned on the real per capita income. It appears from this Figure that while the marginal impact increases as the real per capita income improves, it is not statistically significant for values of the real per capita income lower than US\$ 751, and higher than US\$ 17641. In other words, the membership duration exerts no significant effect on total commercial services exports by very low-income countries or by very high-income countries. Conversely, it exerts a positive and significant effect on countries whose real per capita income range between US\$ 282 and US\$ 65129.4. As confirmed by estimates in columns [2] and [3], these findings reflect differentiated effects of the membership duration on modern services exports, on the one hand, and on traditional services exports, on the other hand. Estimates in column [2] (and in line 4) reveal that the coefficient of the variable "DUR" is negative and significant at the 1% level, while the coefficient of the interaction variable "[DUR*Log(GDPC)]" is positive and significant at the 1% level. At the same time, estimates in column [3] (line 4) show that the coefficient of the variable "DUR" is positive and significant at the 1% level, while the coefficient of the interaction variable "[DUR*Log(GDPC)]" is negative and significant at the 1% level. These sets of outcomes suggest on the one hand, that on average over the full sample, the membership duration is positively associated with modern services exports in countries whose real per capita income is higher than US\$ 698 [$= \text{exponential}(0.645/0.0985)$]. It influences negatively modern services exports in very

low-income countries, that is, those whose real per capita income is lower than US\$ 698. On the other hand, countries that enjoy a real per capita income higher than US\$ 795 [(= exponential (0.193/0.0289))] experience a negative effect of the membership duration on traditional services exports, with the magnitude of this negative effect increasing as the real per capita income increasing. In contrast, low-income countries, including those with a real per capita income lower than US\$ 795 experience a positive effect of the membership duration on traditional services exports. For these countries, the lower the real per capita income, the larger is the magnitude of the positive effect of the membership duration on traditional services exports. These findings are confirmed in Figures 7 and 8. Figure 7 shows at the 95 per cent confidence intervals, the marginal impact of the membership duration on modern services exports for varying levels of the real per capita income. Figure 8 shows at the 95 per cent confidence intervals, the marginal impact of the membership duration on traditional services exports for varying levels of the real per capita income. We note from Figure 7 that the marginal impact of the membership duration on modern services exports increases as the real per capita income rises. It is positive for member states whose real per capita income is higher than US\$ 1041, and negative for member states whose real per capita income is lower than US\$ 436. It is statistically nil for countries whose real per capita ranges from US\$ 436 to US\$ 1041. Concurrently, we obtain from Figure 8 that the effect of the membership duration on traditional services exports decreases as the real per capita income rises. Specifically, the membership duration exerts no significant effect on traditional services exports in countries whose real per capita income is lower than US\$ 1443. However, countries whose real per capita income exceeds US\$ 1443 experience a negative effect of the membership duration on traditional services exports, and for these countries, the higher the real per capita income, the larger is the magnitude of the negative effect of the membership duration on traditional commercial services exports.

The key messages conveyed by the outcomes provided in lines 3 and 4 (and columns [1] to [3]) of Table 6 are that as their membership duration increases, very low-income member states experience lower exports of modern services items, but at the same time, they do not really improve their exports of traditional services items. This outcomes underlines the limited trading capacity of very low-income member states. In contrast, member states with a relatively higher per capita income tend to increase modern services exports at the expense of traditional services exports, as their membership duration increases.

Estimates presented in lines 7 and 8 (columns [1] to [3]) of Table 6 show that the coefficients of the variable "DUR" are negative and significant at the 1% level, while the interaction terms of the variable "DUR*FTR" are positive and significant at the 1% level (for estimates in columns [1] and [2]) and at the 10% level for estimates in column [3]. Note that at the same time, the coefficient of the variable "FTR" is positive and significant at the 1% level in columns [1] and [3], but negative and not significant at the 10% level in column [2]. We can, therefore, infer that the membership duration has led to higher exports of commercial services items, including both modern and traditional services items, as member states improve their capacities to use, adopt and adapt frontier technologies, and especially if the level of frontier technology readiness exceeds a certain value. This value amounts to 0.39 (= 0.0321/0.0817), 0.158 (= 0.0939/0.595), and 1.02 (=

0.0287/0.0281) (here only at the 10% level¹⁷) when the dependent variable is respectively measured by the total commercial services exports, modern services exports, and traditional services exports. Figures 9 to 11, show at the 95 per cent confidence intervals, the marginal impact of the membership duration respectively on total commercial services exports, modern services exports, and traditional services exports, for varying values of the frontier technology readiness index. While all three Figures indicate that the marginal impact increases as countries improve their capacities to use, adopt and adapt frontier technologies, this marginal impact is not always statistically significant in each of these Figures. In Figure 9, the marginal impact of the membership duration on total commercial services exports is positive and significant for countries that have enjoyed a high level of frontier technology readiness, in particular if the value of the later is higher than 0.70. Otherwise, this marginal impact is negative (notably for values of "FTR" lower than 0.27), or at best statistically nil. In Figure 10, this marginal impact is positive and significant for values of the indicator "FTR" higher than 0.20. Hence, member states whose level of readiness to use, adopt and adapt frontier technologies is higher than 0.20 have experienced a positive and significant effect of the membership duration on modern services exports, with the magnitude of this positive impact increasing as the level of FTR rises. In contrast, for countries with lower values of FTR (in particular when values of FTR are lower than 0.14), the membership duration exerts a negative and significant effect on modern services exports. There is no significant effect of the membership duration on modern services exports in Member states whose values of FTR range from 0.14 to 0.20.

Figure 11 indicates that the membership duration has been associated with lower traditional exports in Members whose values of FTR are lower than 0.53, and has exerted no significant effect on member states whose values of FTR are higher than 0.53.

In a nutshell, Figures 10 and 11 convey the message that the membership duration has been associated with higher modern services exports in countries with a relatively high level of the frontier technology readiness (i.e., when values of the "FTR" indicator are higher than 0.20). For these countries, the higher the capacities to use, adopt and adapt frontier technologies, the larger is the positive effect of the membership duration on modern services exports. In parallel, member states whose level of FTR ranged between 0.20 and 0.53 experienced a negative effect of the membership duration on traditional services exports. These findings, therefore, suggest that countries whose level of frontier technology readiness was higher than 0.20, but lower than 0.53, experienced a positive effect of the membership duration on modern services exports, but a negative effect of the membership duration on traditional services exports. For countries with values of FTR lower than 0.20, the membership duration is associated with lower modern and traditional services exports. Finally, member states whose level of FTR was higher than the value of 0.53 have experienced a positive effect of the membership duration on traditional services exports.

Outcomes reported in lines 11 and 12 and across columns [1] to [3] show that the coefficients of both the variables "DUR" and ["DUR*Log(MERCH)"] are positive and significant at the 1% level. Note that at the same time, the coefficient of the variable "Log(MERCH)" is negative and significant at the 1% level in columns [1] to [3]. We may be tempted to deduce that

¹⁷ The value of 1.02 obtained for the level of "FTR" is higher than 1, whereas the values of this indicator are lower than 1 over the full sample (see Appendix 3a).

the membership duration is consistently associated with higher commercial services exports (both total commercial services exports and, modern and traditional services exports) as the share of merchandise exports in GDP (as the first measure of countries' penetration in the goods markets) rises. To get a better picture on these impacts, we display in Figures 12 to 14, at the 95 per cent confidence intervals, the marginal impact of the membership duration respectively on total commercial services exports, modern services exports, and traditional services exports, for varying shares of merchandise exports in GDP. The three Figures show that while the marginal impact of the membership duration on each of the three commercial services indicators increases as the share of merchandise exports in GDP rises, it is not always significant, and can additionally be positive and negative. Specifically, this marginal impact is positive and significant when the share of merchandise exports in GDP is higher than a certain value¹⁸. For lower values of this indicator, the marginal impact is negative, and at best statistically nil. These values amount to 0.135 (i.e., 13.5%) for the effect of the membership duration on total commercial services exports, 0.18 (i.e., 18%) for the effect of the membership duration on modern services exports, and 0.15 (i.e., 15%) for the effect of the membership duration on traditional services exports. These outcomes, therefore, support hypothesis 4.

Likewise, we note from lines 14 and 15, and in particular from column [1] of this Table that the coefficient of the variable "DUR" is positive and significant at the 1% level, while the coefficient of the interaction variable "(DUR*ECI)" is yet positive, but not significant at the conventional significance levels. Note that the coefficient of the variable "ECI" is negative and significant at the 1% level, and the 10% level respectively in columns [2] to [3], while it is yet positive but not significant at the 10% level in column [1] of the Table. We can infer that on average, over the full sample, the effect of the membership duration on total commercial services tends to increase as the membership duration rises, but this effect does not seem to depend on countries' level of economic complexity. Concurrently, we obtain from columns [2] and [3] of the Table that the coefficients of the variables "DUR" and "(DUR*ECI)" are positive and significant at the 1% level. Note that at the same time, the coefficient of the variable "ECI" is yet positive, but not significant in column [1], but negative and significant at least at the 10% level in columns [2] and [3]. Figures 15 to 17 provide, at the 95 per cent confidence intervals, the marginal impact of the membership duration respectively on total commercial services exports, modern services exports, and traditional services exports, for varying levels of economic complexity. Figure 15 shows that the marginal impact of the membership duration on total commercial services exports consistently is always positive and significant, and consistently increases as countries export increasingly complex products. Figure 16 shows that the membership duration has exerted a positive and significant effect on modern services exports in countries whose level of economic complexity¹⁹ is higher than -0.66 (other countries experience either a negative effect or at best a statistical nil effect of the membership duration on modern services exports). For these countries, the greater the level of economic complexity, the higher is the magnitude of the positive effect of the membership duration on modern services exports. Finally, member states whose level of economic complexity exceeds -1.34 experience a positive effect of the membership duration on

¹⁸ Values of the indicator of the share of merchandise exports in GDP over the full sample range from 0.017 (i.e., 1.7%) to 1.943 (i.e., 194.3%) (see Appendix 3a).

¹⁹ Values of the indicator of economic complexity over the full sample range from -2.3 and 1.98 (see Appendix 3a).

traditional services exports, with the magnitude of this effect rising as the level of economic complexity increases. The membership duration exerts no significant effect on traditional services exports in countries whose level of economic complexity is lower than -1.34.

Overall, these outcomes support hypothesis 4 that as countries improve their penetration in the goods markets (especially above a minimum level of this penetration), they enjoy higher exports of commercial services items, including both modern and traditional services items.

5. Conclusion

This article aims to complement the existing works on the trade effects of the GATT/WTO membership by focusing on international trade in services. In particular, it complements the recent work by Gnanon (2022a) on the effect of the membership in the WTO on commercial services exports, and services export diversification, by investigating the effect of the duration of GATT/WTO membership on commercial services exports, including modern and traditional services exports. The analysis has been performed on an unbalanced panel dataset of 128 countries over the period from 2008 to 2019, and used primarily the two-step system GMM estimator. It has established several findings. First, the duration of membership in the GATT/WTO has been positively associated with total commercial services exports, including modern and traditional services exports. Second, the membership duration has exerted a larger positive effect on total commercial services exports (including traditional services exports) in Article XII Members than Non-Article XII Members. The membership duration exerts a positive effect (of the same magnitude) on modern services exports in both groups of Members. More generally, as the duration of their membership in the GATT/WTO increases, low-income member states tend to increase their exports of traditional services items at the expense of modern services exports items. In contrast, member states with a relatively higher per capita income tend to increase modern services exports at the expense of traditional services exports, when their membership duration rises.

Third, while the duration of membership in the GATT/WTO exerts a positive effect on total commercial services exports as member states improve their capacities to use, adopt and adapt frontier technologies, this outcome reflects the fact that the membership duration has been associated with higher modern services exports the frontier technology readiness exceeds a certain level. The magnitude of this positive effect rises as countries' capacities to use, adopt and adapt frontier technologies further improve. Concurrently, member states do not increase their traditional services exports when they start significantly improving their capacities to use, adopt and adapt frontier technologies.

Fourth and finally, the duration of membership in the GATT/WTO has fostered commercial services exports, including both modern and traditional services exports, as member states increase their penetration in the goods markets. The magnitude of this positive effect is larger for countries that enjoy a higher penetration in goods markets than for those that experience a lower penetration in goods markets. The penetration in goods markets helps member states develop networks in these markets that could be exploited to expand the export of services items.

In terms of policy implications, this analysis first underlines the critical role of the GATT and presently of the WTO in promoting its member states' commercial services exports. It also shows that low-income countries need a strong support from the international community to

expand their commercial services exports. These countries lack the requisite financial, human and institutional resources to expand commercial services, including modern services. They tend to rely on the export of traditional services exports (and usually on a few traditional services items such as travel - WTO, 2021), at the expense of modern services exports, including sophisticated ones. The literature has pointed out the strong role of modern services exports for the promotion of economic growth and development (e.g., Anand et al., 2012; Gnangnon, 2021a; Stojkoski et al., 2016) and for the enhancement of countries' economic resilience to shocks (e.g., Ariu, 2016; Borchert and Mattoo, 2010). Thus, even though developing countries would need support from the international community, such a support should be greater for low-income countries if they were to foster their integration into the international trade in services markets.

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TABLES and APPENDICES

Table 1: Kruskal-Wallis equality of populations rank test

	Distribution of		
	CSE	MSE	TSE
Full sample	115.210 (0.0009)	104.166 (0.0079)	139.271 (0.0001)
Article XII Members	60.037 (0.0001)	52.966 (0.0006)	58.468 (0.0001)
Non-Article XII Members	47.599 (0.8333)	63.327 (0.2940)	60.667 (0.3800)

The Kruskal-Wallis test is a multi-sample generalization of the two-sample Wilcoxon (Mann-Whitney) rank-sum test.

Table 2: Effect the duration of the GATT/WTO membership on commercial services exports over the full sample
Estimator: POLS-DK

	Full Sample			Article XII Members			Non-Article XII Members		
Variables	Log(CSE) (1)	Log(MSE) (2)	Log(TSE) (3)	Log(CSE) (4)	Log(MSE) (5)	Log(TSE) (6)	Log(CSE) (7)	Log(MSE) (8)	Log(TSE) (9)
One-Year lag of the dependent variable	0.955*** (0.0101)	0.898*** (0.0145)	0.971*** (0.0102)	0.945*** (0.00814)	0.929*** (0.0196)	0.938*** (0.0170)	0.956*** (0.0103)	0.890*** (0.0137)	0.975*** (0.0104)
DUR	-0.00536 (0.00473)	0.00619 (0.0106)	-0.00650** (0.00313)	0.0197 (0.0163)	0.0350** (0.0147)	0.0116 (0.0213)	-0.00877 (0.00656)	-0.000610 (0.0117)	-0.00910** (0.00444)
Log(GDPC)	0.00327 (0.0182)	-0.0109 (0.0228)	-0.00142 (0.0128)	-0.0183 (0.0116)	-0.0437 (0.0364)	-0.0161 (0.0184)	0.0106 (0.0207)	-0.00222 (0.0236)	0.00161 (0.0135)
FTR	0.0912 (0.0664)	0.362*** (0.0899)	0.0666 (0.0511)	0.188*** (0.0344)	0.426*** (0.148)	0.173*** (0.0561)	0.0467 (0.0864)	0.353*** (0.101)	0.0352 (0.0595)
Log(REER)	-0.128*** (0.0439)	-0.184*** (0.0506)	-0.0974*** (0.0242)	-0.119 (0.100)	-0.101 (0.170)	-0.127 (0.0983)	-0.133*** (0.0363)	-0.200*** (0.0397)	-0.0884*** (0.0210)
Log(POP)	-0.0157** (0.00631)	-0.0253** (0.00983)	-0.0137** (0.00684)	-0.0294*** (0.00330)	-0.0285** (0.0117)	-0.0375*** (0.00999)	-0.0112 (0.00681)	-0.0221** (0.00997)	-0.00892 (0.00713)
Constant	0.699*** (0.241)	0.790*** (0.246)	0.608*** (0.200)	0.941* (0.459)	0.747 (0.776)	1.083* (0.561)	0.620*** (0.205)	0.740*** (0.256)	0.492*** (0.174)
Observations - Countries	1,390 - 128	1,372 - 128	1,372 - 128	316 - 29	316 - 29	316 - 29	1,074 - 99	1,056 - 99	1,056 - 99
R-squared	0.958	0.904	0.964	0.970	0.935	0.960	0.955	0.898	0.964

Note: * p -value < 0.1; ** p -value < 0.05; *** p -value < 0.01. Robust Standard errors are in parenthesis.

Table 3: Effect the duration of the GATT/WTO membership on commercial services exports over the full sample

Estimator: Two-Step System GMM

Variables	Log(CSE) (1)	Log(MSE) (2)	Log(TSE) (3)
One-Year lag of the dependent variable	0.768*** (0.0218)	0.541*** (0.0159)	0.798*** (0.0191)
DUR	0.120*** (0.0148)	0.112*** (0.0208)	0.0421*** (0.0109)
Log(GDPC)	-0.0462** (0.0205)	-0.0901** (0.0383)	0.0499* (0.0297)
FTR	0.788*** (0.115)	1.307*** (0.175)	0.416** (0.165)
Log(REER)	-0.593*** (0.0687)	-0.377*** (0.0782)	-0.593*** (0.0582)
Log(POP)	-0.0568*** (0.0164)	-0.0449* (0.0250)	-0.0411** (0.0173)
Observations - Countries	1,390 - 128	1,372 - 128	1,372 - 128
AR1 (P-Value)	0.0024	0.0003	0.0021
AR2 (P-Value)	0.4451	0.7885	0.7683
AR3 (P-Value)	0.3129	0.2370	0.5335
OID (P-Value)	0.1533	0.10	0.2939

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The variables "FTR" and "DUR" have been treated as endogenous. Time dummies have been included in the regressions.*

Table 4: Effect the duration of the GATT/WTO membership on commercial services export performance_Over the full sample
Estimator: Two-Step System GMM

Variables	Log(CSEPERF) (1)	Log(MSEPERF) (2)	Log(TSEPERF) (3)
One-Year lag of the dependent variable	0.789*** (0.0194)	0.610*** (0.0173)	0.815*** (0.0203)
Two-Year lag of the dependent variable	0.0921*** (0.0228)	0.171*** (0.0199)	0.0482*** (0.0170)
DUR	0.0780*** (0.0119)	0.0730*** (0.0182)	0.0329*** (0.0106)
Log(GDPC)	-0.0201 (0.0201)	-0.0532 (0.0377)	0.0709** (0.0328)
FTR	0.474*** (0.123)	0.770*** (0.174)	0.193 (0.181)
Log(REER)	-0.562*** (0.0662)	-0.459*** (0.0753)	-0.489*** (0.0503)
Log(POP)	-0.0187 (0.0165)	-0.0435** (0.0210)	-0.0228 (0.0197)
Observations - Countries	1,263 - 128	1,244 - 128	1,244 - 128
AR1 (P-Value)	0.0081	0.0003	0.0046
AR2 (P-Value)	0.6335	0.1334	0.8823
AR3 (P-Value)	0.2027	0.1626	0.5759
OID (P-Value)	0.2330	0.1925	0.3850

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The variables "FTR", "DUR" and the interaction variables have been treated as endogenous. Time dummies have been included in the regressions.*

Table 5: Effect of the duration of the GATT/WTO membership on commercial services exports over the full sample

Estimator: Two-Step System GMM

Variables	Log(MSE) (1)	Log(TSE) (2)	Log(TSE) (3)
One-Year lag of the dependent variable	0.544*** (0.0206)	0.793*** (0.0217)	0.796*** (0.0209)
DUR	0.103*** (0.0250)	0.0188* (0.0112)	-0.110*** (0.0347)
Log(TSE)	0.208*** (0.0304)		
Log(MSE)		0.0608*** (0.0127)	0.135*** (0.0218)
DUR*Log(MSE)			-0.0250*** (0.00624)
Log(GDPC)	-0.0760** (0.0356)	0.0586* (0.0315)	0.0790*** (0.0304)
FTR	0.766*** (0.184)	0.276 (0.169)	0.191 (0.162)
Log(REER)	-0.309*** (0.0786)	-0.571*** (0.0590)	-0.597*** (0.0565)
Log(POP)	0.0174 (0.0288)	-0.0215 (0.0191)	-0.00650 (0.0183)
Observations - Countries	1,372 - 128	1,372 - 128	1,372 - 128
AR1 (P-Value)	0.0002	0.0017	0.0016
AR2 (P-Value)	0.8474	0.7745	0.7602
AR3 (P-Value)	0.2583	0.5809	0.5826
OID (P-Value)	0.10	0.1542	0.1182

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The variables "FTR", "DUR" and the interaction variables have been treated as endogenous. Time dummies have been included in the regressions.*

Table 6: Effect of the duration of the GATT/WTO membership on commercial services exports
Estimator: Two-Step System GMM

	Variables	Log(CSE) (1)	Log(MSE) (2)	Log(TSE) (3)
<i>Effect of the duration of GATT/WTO Membership on commercial services exports in <u>Article XII Members</u> versus <u>Non-Article XII Members</u></i>				
(1)	DUR	0.0389*** (0.0142)	0.0815*** (0.0282)	-0.0283** (0.0139)
(2)	DUR*ARTXII	0.0332** (0.0161)	0.0287 (0.0364)	0.0591*** (0.0157)
<i>Effect of the duration of GATT/WTO Membership on commercial services exports across countries in the <u>full sample</u></i>				
(3)	DUR	0.00799 (0.0612)	-0.645*** (0.0904)	0.193*** (0.0532)
(4)	DUR*Log(GDPC)	0.00261 (0.00775)	0.0985*** (0.0117)	-0.0289*** (0.00659)
(5)	Log(GDPC)	-0.110*** (0.0278)	-0.354*** (0.0372)	0.0595** (0.0259)
<i>Effect of the duration of GATT/WTO Membership on commercial services exports in the <u>full sample</u> conditioned on the level of frontier technology readiness</i>				
(8)	DUR	-0.0321*** (0.00566)	-0.0939*** (0.0117)	-0.0287*** (0.00512)
(9)	DUR*FTR	0.0817*** (0.0219)	0.595*** (0.0410)	0.0281* (0.0160)
(10)	FTR	0.739*** (0.0835)	-0.103 (0.125)	0.487*** (0.0915)
<i>Effect of the duration of GATT/WTO Membership on commercial services exports in the <u>full sample</u> conditioned on the share of merchandise exports in GDP</i>				
(11)	DUR	0.141*** (0.0217)	0.318*** (0.0330)	0.0839*** (0.0211)
(12)	DUR*Log(MERCH)	0.0590*** (0.0114)	0.163*** (0.0168)	0.0350*** (0.0112)
(13)	MERCH	-0.193*** (0.0332)	-0.492*** (0.0482)	-0.0764*** (0.0287)
<i>Effect of the duration of GATT/WTO Membership on commercial services exports in the <u>full sample</u> conditioned on the level of economic complexity</i>				
(14)	DUR	0.0629*** (0.00639)	0.113*** (0.0175)	0.0551*** (0.00716)
(15)	DUR*ECI	0.00470 (0.00750)	0.124*** (0.0125)	0.0270*** (0.00671)
(16)	ECI	0.0164	-0.374***	-0.0460*

	(0.0209)	(0.0389)	(0.0241)
<p><i>Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The variables "FTR", "DUR" and the interaction variables have been treated as endogenous. Time dummies have been included in the regressions. All model specifications whose results are reported here are correctly specified, as all requirements for the validity of GMM estimator are met. In addition, the estimates of control variables in all these regressions are similar to those in Table 3. Note that the specifications of the baseline model (1) whose results are reported in lines (5) and (6), as well as in lines (13) to (16) of this Table include the dummy "ARTXII" along with four interaction variables: the triple interaction between the dummy "ARTXII", the variable "DUR" and the relevant conditioning variable; the multiplicative variable between the relevant conditioning variable and the variable "DUR"; the multiplicative variable between the relevant conditioning variable and the dummy "ARTXII"; and finally the multiplicative variable between the variable "DUR" and the dummy "ARTXII". The relevant conditioning variable is respectively "GDPC", "MERCH" and "ECI".</i></p>			

Appendix 1: Definition and Source of variables

Variables	Definition	Source
CSE	This is the share of total commercial services exports in GDP. For the sake of the analysis, this variable is not expressed in percentage when used in the regressions. It is the sum of modern and traditional services exports described below.	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with ITC and UNSD, and data on GDP (US\$ current prices) from the World Development Indicators (WDI).
MSE	This is the share of modern commercial services exports in GDP. For the sake of the analysis, this variable is not expressed in percentage when used in the regressions.	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with ITC and UNSD, and data on GDP (US\$ current prices) from the World Development Indicators (WDI). Modern services cover the following major sub-sectors: 'Insurance and pension services'; 'Financial services'; 'Telecommunications, computer, and information services'; 'Charges for the use of intellectual property n.i.e'; and 'Other business services'.
TSE	This is the share of traditional commercial services exports in GDP. For the sake of the analysis, this variable is not expressed in percentage when used in the regressions.	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with ITC and UNSD, and data on GDP (US\$ current prices) from the WDI. The share of traditional commercial services exports in percentage of GDP is computed as the difference between the share of total commercial services exports in percentage of GDP and the share of modern commercial services exports in percentage of GDP. Traditional services cover the following major sub-sectors: 'goods-related services (i.e., manufacturing services on physical inputs owned by others and Maintenance and repair services)'; 'Transport'; 'Travel exports'; 'Construction'; and 'Personal, cultural, and recreational services'.
CSEPERF	This is the indicator of the performance in terms of total commercial services exports by a given country in a given year. It is defined, in reference to Okafor and	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with

	<p>Teo (2019: p3457), as the ratio of a given country' share of total commercial services exports to its share of gross domestic product. In other words, it is computed as follows:</p> $CSEPERF_{it} = \frac{CSE_{it}}{CSEW_{it}},$ <p>where the variable "CSE_{it}" is a country's share of total commercial services in GDP, and "$CSEW_{it}$" is the ratio of the world total commercial services exports to the world GDP. Note that for the sake of the analysis, this variable is not expressed in percentage.</p>	ITC and UNSD, and data on GDP (US\$ current prices) from the WDI.
MSEPERF	<p>This is the indicator of the performance in terms of modern commercial services exports by a given country in a given year. It is defined, in reference to Okafor and Teo (2019: p3457), as the ratio of a given country' share of modern commercial services exports to its share of gross domestic product. In other words, it is computed as follows:</p> $MSEPERF_{it} = \frac{MSE_{it}}{MSEW_{it}},$ <p>where the variable "MSE_{it}" is a country's share of modern commercial services in GDP, and "$MSEW_{it}$" is the ratio of the world modern commercial services exports to the world GDP. Note that for the sake of the analysis, this variable is not expressed in percentage.</p>	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with ITC and UNSD, and data on GDP (US\$ current prices) from the WDI.
TSEPERF	<p>This is the indicator of the performance in terms of traditional commercial services exports by a given country in a given year. It is defined, in reference to Okafor and Teo (2019: p3457), as the ratio of a given country' share of traditional commercial services exports to its share of gross domestic product. In other words, it is computed as follows:</p> $TSEPERF_{it} = \frac{TSE_{it}}{TSEW_{it}},$ <p>where the variable "TSE_{it}" is a country's share of traditional commercial services in GDP, and "$TSEW_{it}$" is the ratio of the world traditional commercial services exports to the world GDP. Note that for the sake of the analysis, this variable is not expressed in percentage.</p>	Author's computation based on data on services exports developed by the WTO/UNCTAD in cooperation with ITC and UNSD, and data on GDP (US\$ current prices) from the WDI.
DUR	<p>This is the transformed indicator of the duration of GATT/WTO membership (see its description in section 3.1).</p>	<p>Author's computation based on data collected from the website of the WTO. The list of countries (128) that had signed GATT by 1994 is accessible online at: https://www.wto.org/english/thewto_e/gattmem_e.htm</p>

		The list of states that were GATT Members, and that joined the WTO, as well as those that joined the WTO under the WTO's Article XII is accessible online at: (https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm)
FTR	This is the frontier technology readiness index, which reflects a country's technological capacities related to physical investment, human capital and technological effort. It measures a country's capacities to use, adopt and adapt these technologies. Five indicators have been used to measure a country's capacity to use, adopt and adapt frontier technologies. These are ICT deployment, skills, R&D activity, industry activity and access to finance (see UNCTAD, 2021). The FTR index has been obtained by using the principal components analysis applied to these five indicators. Its values range between 0 and 1, with values closer to 1 indicating a country readiness to use and adopt frontier technologies. In contrast, values of this index closer to 0 indicates that a country is less ready for the use and adoption of frontier technologies.	Data extracted from the UNCTAD Database (see online at https://unctadstat.unctad.org/wds/TableView/tableView.aspx?ReportId=227701)
REER	This is the measure of the real effective exchange rate (based on the consumer price index), computed using a nominal effective exchange rate based on 66 trading partners. An increase in the values of this index indicates an appreciation of the real effective exchange rate, i.e., an appreciation of the home currency against the basket of currencies of trading partners.	Bruegel Datasets (see Darvas 2012a, 2012b). The dataset can be found online at: http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/
MERCH	This is the share of merchandise exports in GDP. For the sake of the analysis, this variable is not expressed in percentage.	Author's calculation based on data on merchandise exports (current US\$) and GDP (current US\$) extracted from the WDI.
ECI	This is the economic complexity index. It reflects the diversity and sophistication of a country's export structure, and hence indicates the diversity and ubiquity of that country's export structure. It has been estimated- using data connecting countries to the products they export, and applying the methodology in described in Hausmann and Hidalgo (2009). Higher values of this index reflect greater economic complexity.	MIT's Observatory of Economic Complexity (https://oec.world/en/rankings/eci/hs6/hs96)
GDPC	Real per capita Gross Domestic Product (constant 2015 US\$).	WDI
POP	Total Population	WDI

Appendix 2: Duration of the GATT and WTO membership as at 2019 (end-year of the period under analysis)

Country	Duration of Membership in 2019	Country	Duration of Membership in 2019	Country	Duration of Membership in 2019	Country	Duration of Membership in 2019
Afghanistan**	4	Czech Republic	27	Kyrgyz Republic**	22	Qatar	26
Albania**	20	Djibouti	26	Lao PDR**	7	Romania	49
Algeria	0	Dominican Republic	70	Latvia**	21	Russian Federation**	8
Argentina	53	Ecuador**	24	Lebanon	0	Rwanda	54
Armenia**	17	Egypt, Arab Rep.	50	Libya	0	Sao Tome and Principe	0
Azerbaijan	0	El Salvador	29	Lithuania**	19	Saudi Arabia**	15
Bahamas	0	Estonia**	21	Madagascar	57	Senegal	57
Bangladesh	48	Eswatini	27	Malawi	56	Serbia	0
Barbados	53	Ethiopia	0	Malaysia	63	Sierra Leone	59
Belarus	0	Fiji	27	Maldives	37	Singapore	47
Belize	37	Gabon	57	Mali	27	Slovak Republic	27
Benin	57	Gambia	55	Malta	56	Slovenia	26
Bolivia	30	Georgia**	20	Mauritania	57	South Africa	72
Bosnia and Herzegovina	0	Ghana	63	Mauritius	50	Sri Lanka	72
Botswana	33	Guatemala	29	Mexico	34	St. Lucia	27
Brazil	72	Guinea	26	Moldova**	19	St. Vincent and the Grenadines	27
Brunei Darussalam	27	Guyana	54	Mongolia**	23	Sudan	0
Bulgaria**	24	Haiti	70	Morocco	33	Suriname	42
Burkina Faso	57	Honduras	26	Mozambique	28	Tajikistan**	7
Burundi	55	Hong Kong SAR, China	34	Namibia	28	Tanzania	59
Cabo Verde**	12	Hungary	47	Nepal**	16	Thailand	38
Cambodia**	16	India	72	Nicaragua	70	Togo	56
Cameroon	57	Indonesia	70	Nigeria	60	Trinidad and Tobago	58
China**	19	Iran, Islamic Rep.	0	North Macedonia**	17	Tunisia	30
Colombia	39	Iraq	0	Oman**	20	Turkey	69
Comoros	0	Israel	58	Pakistan	72	Uganda	58
Congo, Dem. Rep.	49	Jamaica	57	Panama**	23	Ukraine**	12

Congo, Rep.	57	Jordan**	20	Papua New Guinea	26	United Arab Emirates	26
Costa Rica	30	Kazakhstan**	5	Paraguay	26	Uruguay	67
Cote d'Ivoire	57	Kenya	56	Peru	69	Vietnam**	13
Croatia**	20	Korea, Rep.	53	Philippines	41	Yemen, Rep**	6
Cyprus	57	Kuwait	57	Poland	53	Zambia	38

*Note: Each of the 29 Article XII Members of the WTO used in the analysis is marked with "**".*

Appendix 3a: Descriptive statistics on variables over the full sample

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
CSE	1,390	0.114	0.143	0.001	1.205
MSE	1,375	0.030	0.067	0.00012	0.793
TSE	1,375	0.084	0.099	0.001	0.787
CSEPERF	1,390	1.779	2.239	0.019	19.370
MSEPERF	1,375	0.928	2.089	0.003	26.945
TSEPERF	1,375	2.687	3.148	0.025	24.580
DUR1	1,390	30.745	21.258	0.000	72.000
FTR	1,390	0.350	0.219	0.000	0.977
MERCH	1,390	0.306	0.252	0.017	1.943
ECI	1,232	-0.117	0.862	-2.281	1.978
REER	1,390	112.015	21.083	50.507	295.975
GDPC	1,390	8165.144	10554.360	281.970	65129.380
POP	1,390	47200000	169000000	108260	1400000000

Appendix 3b: Descriptive statistics on variables over the sub-sample of Article XII Members

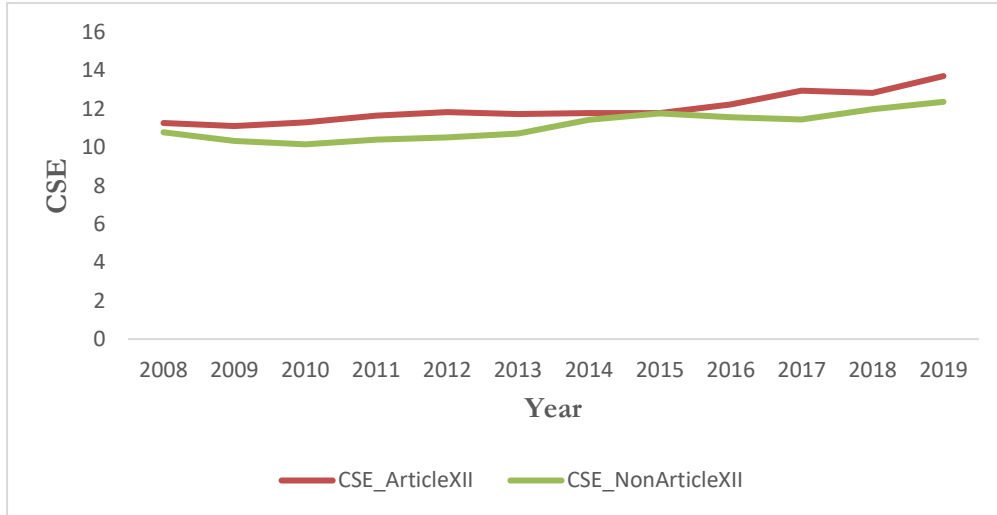
Variable	Observations	Mean	Standard deviation	Minimum	Maximum
CSE	316	0.121	0.083	0.010	0.357
MSE	316	0.022	0.019	0.00095	0.087
TSE	316	0.099	0.072	0.006	0.335
CSEPERF	316	1.896	1.290	0.152	5.444
MSEPERF	316	0.675	0.571	0.027	2.439
TSEPERF	316	3.160	2.291	0.192	10.167
DUR1	316	11.459	6.438	0.000	24.000
FTR	316	0.404	0.198	0.000	0.865
MERCH	316	0.316	0.195	0.020	1.009
ECI	305	0.047	0.656	-1.597	1.103
REER	316	113.658	17.863	64.611	216.830
GDPC	316	6634.144	5785.831	472.842	21458.390
POP	316	65300000	249000000	486667	1400000000

Appendix 3c: Descriptive statistics on variables over the sub-sample of Non-Article XII Members

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
CSE	1,074	0.111	0.156	0.001	1.205
MSE	1,059	0.032	0.075	0.00012	0.793
TSE	1,059	0.080	0.105	0.001	0.787
CSEPERF	1,074	1.744	2.448	0.019	19.370
MSEPERF	1,059	1.004	2.355	0.003	26.945
TSEPERF	1,059	2.546	3.349	0.025	24.580
DUR1	1,074	36.419	20.762	0.000	72.000
FTR	1,074	0.334	0.222	0.000	0.977
MERCH	1,074	0.303	0.266	0.017	1.943
ECI	927	-0.171	0.914	-2.281	1.978
REER	1,074	111.532	21.925	50.507	295.975
GDPC	1,074	8615.606	11553.330	281.970	65129.380
POP	1,074	41900000	136000000	108260	1370000000

FIGURES

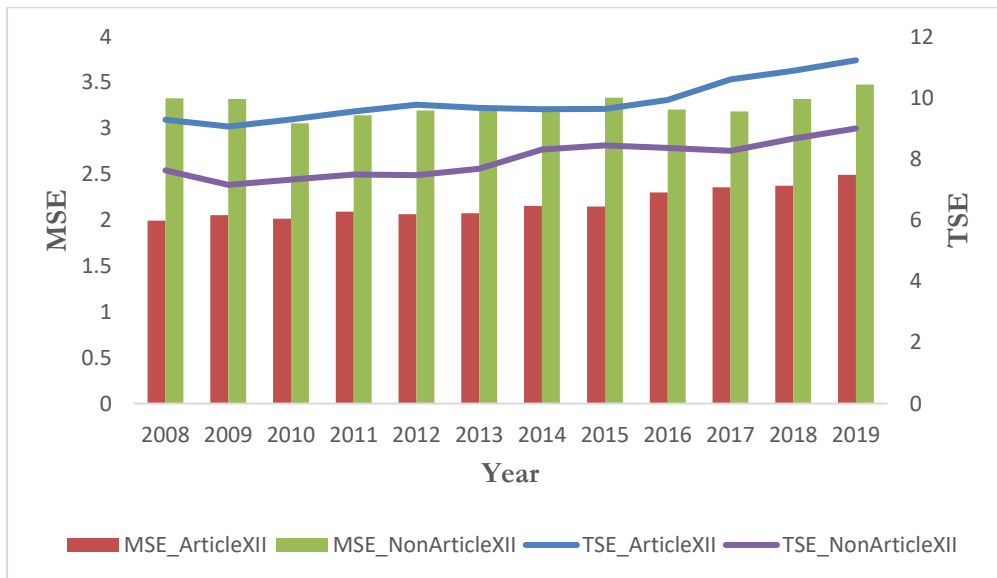
Figure 1: Development of total commercial services exports in Article XII Members versus Non-Article XII Members in the full sample



Source: Author

Note: For the sake of analysis, the indicator "CSE" is expressed here in percentage.

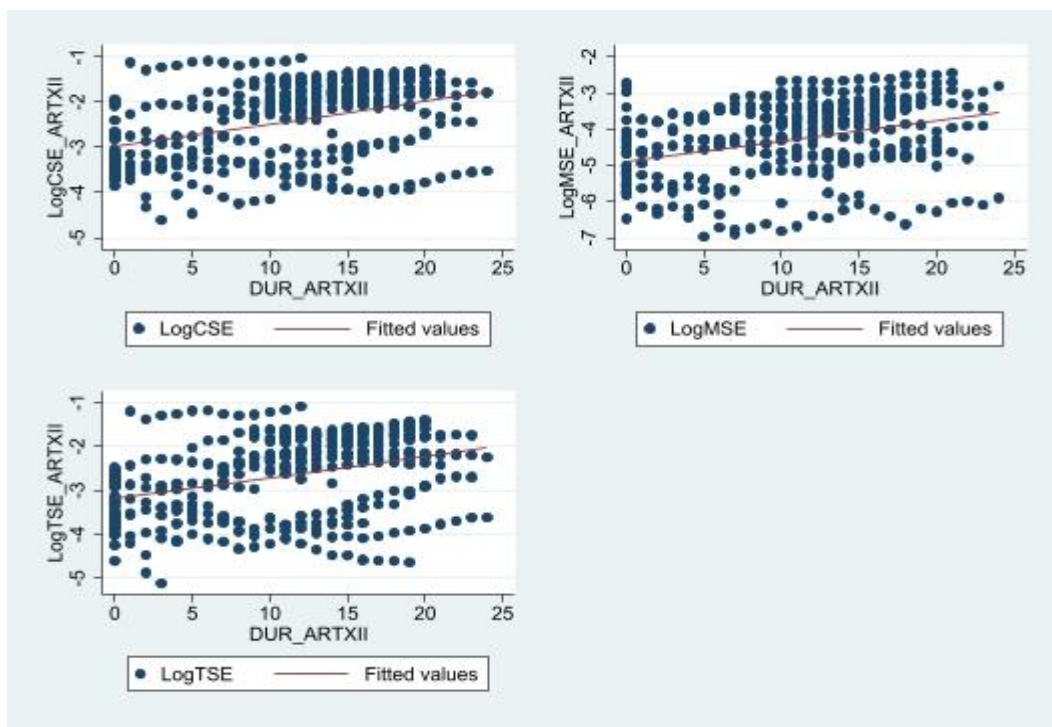
Figure 2: Development of modern and traditional commercial services exports in Article XII Members versus Non-Article XII Members in the full sample



Source: Author

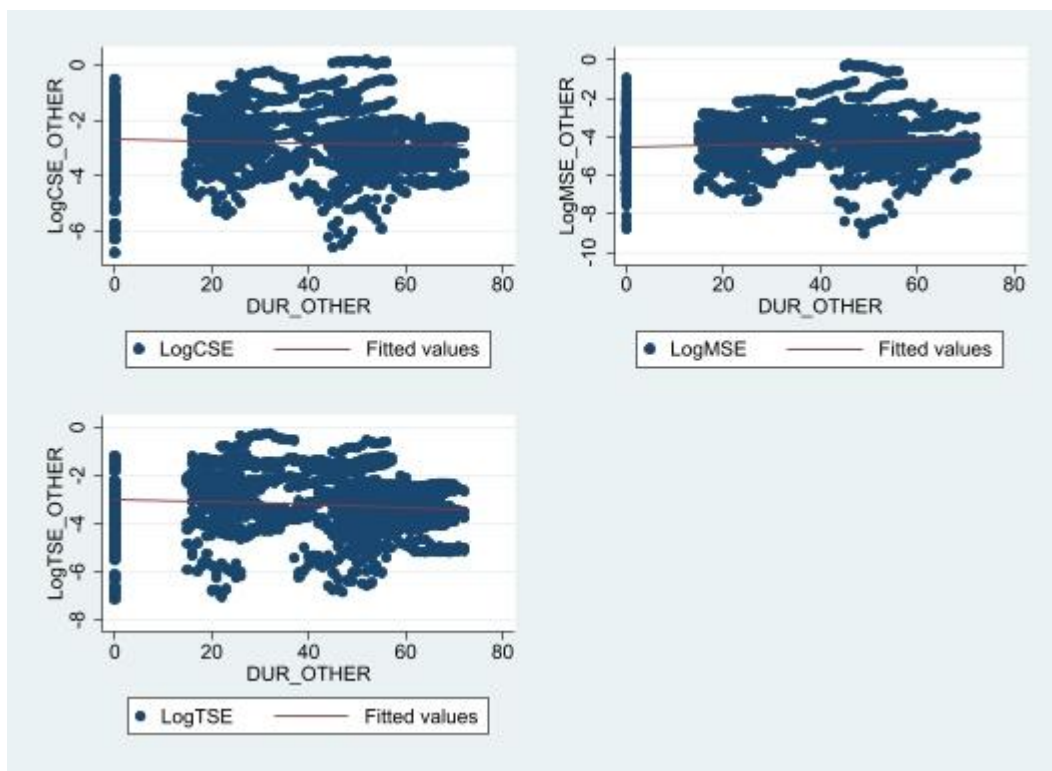
Note: For the sake of analysis, the indicators "MSE" and "TSE" are expressed here in percentage.

Figure 3: Scatter plot between the membership duration in the GATT and WTO and Services Exports_Over the sub-sample of Article XII Members



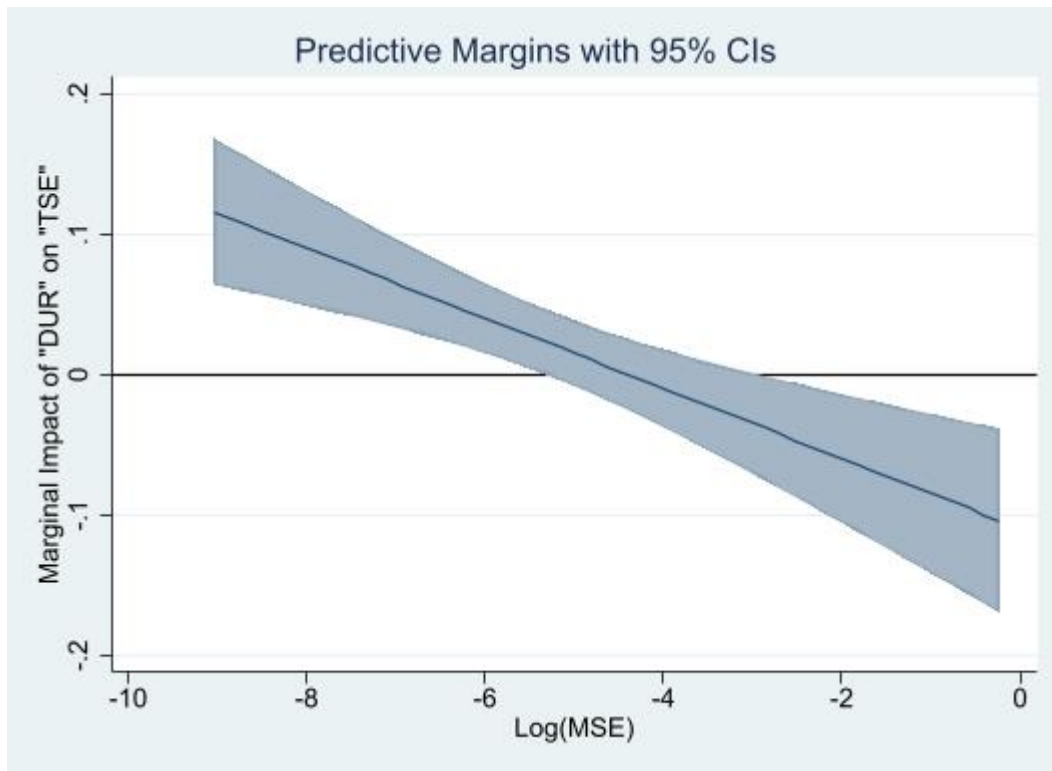
Source: Author

Figure 4: Scatter plot between the membership duration in the GATT and WTO and Services Exports_Over the sub-sample of Other countries (i.e., non-Article XII Members)



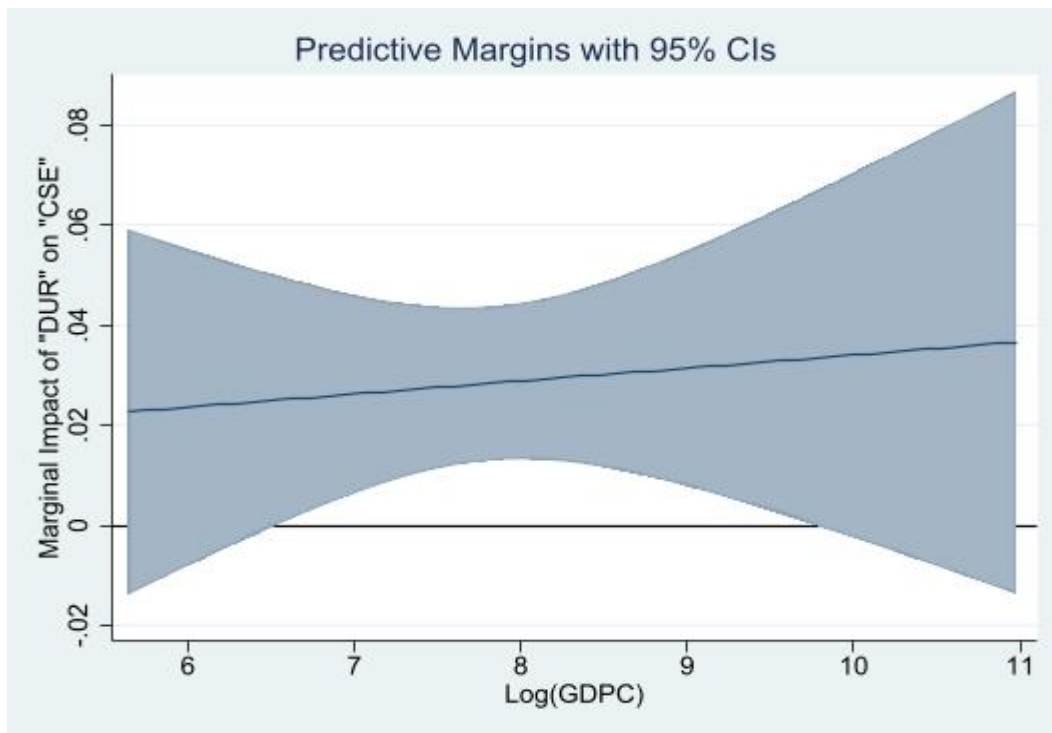
Source: Author

Figure 5: Marginal Impact of "DUR" on "TSE" conditioned on the share of modern services exports in GDP



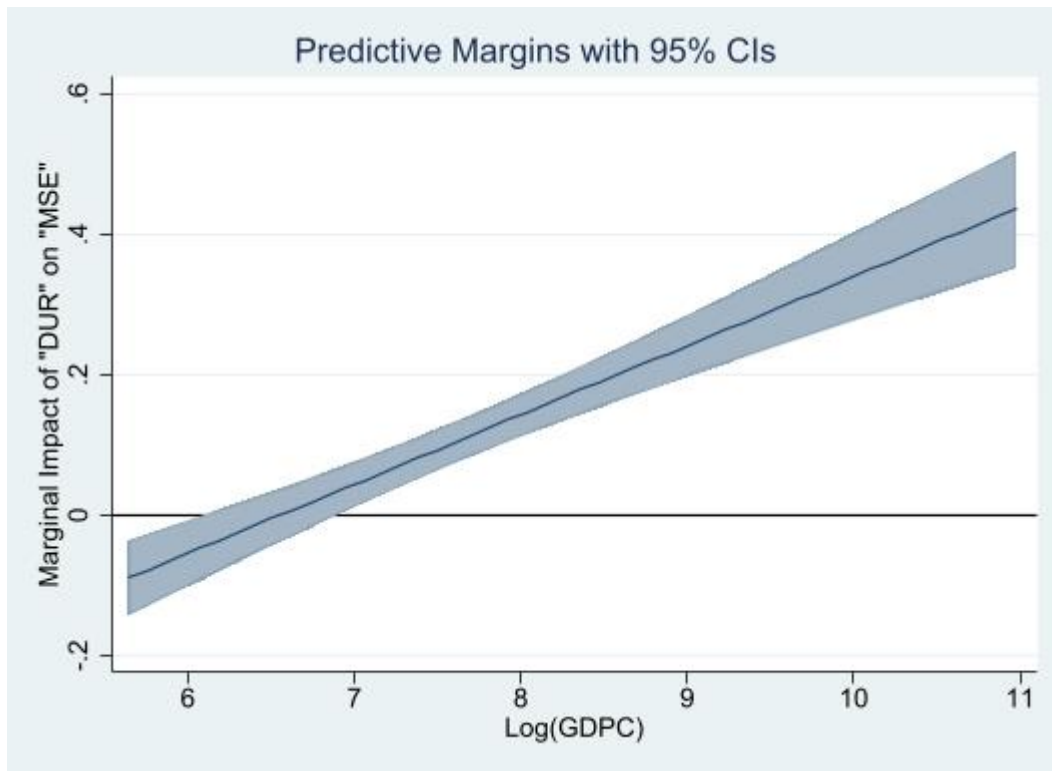
Source: Author

Figure 6: Marginal Impact of "DUR" on "CSE" conditioned on the real per capita income



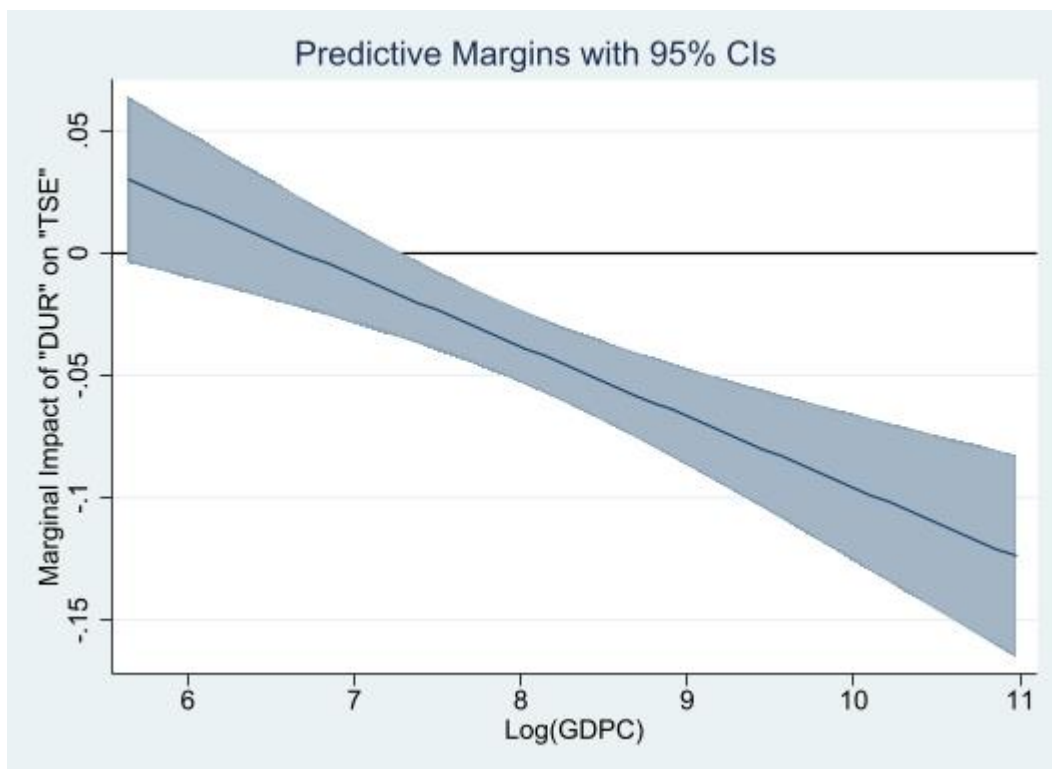
Source: Author

Figure 7: Marginal Impact of "DUR" on "MSE" conditioned on the real per capita income



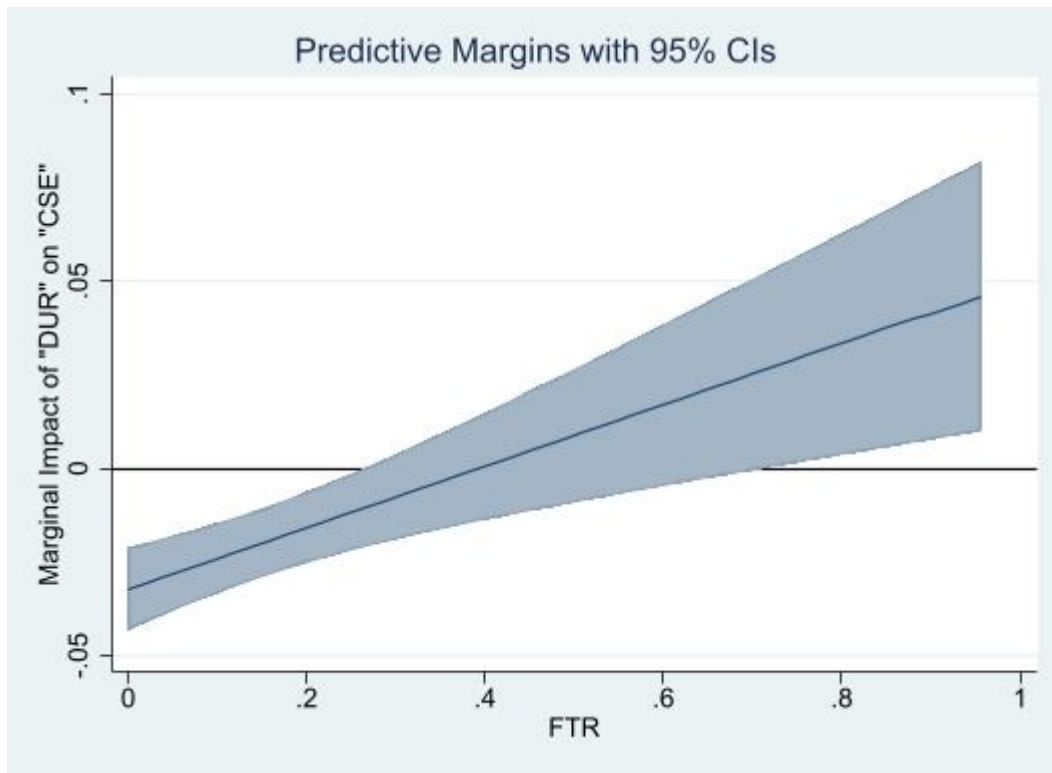
Source: Author

Figure 8: Marginal Impact of "DUR" on "TSE" conditioned on the real per capita income



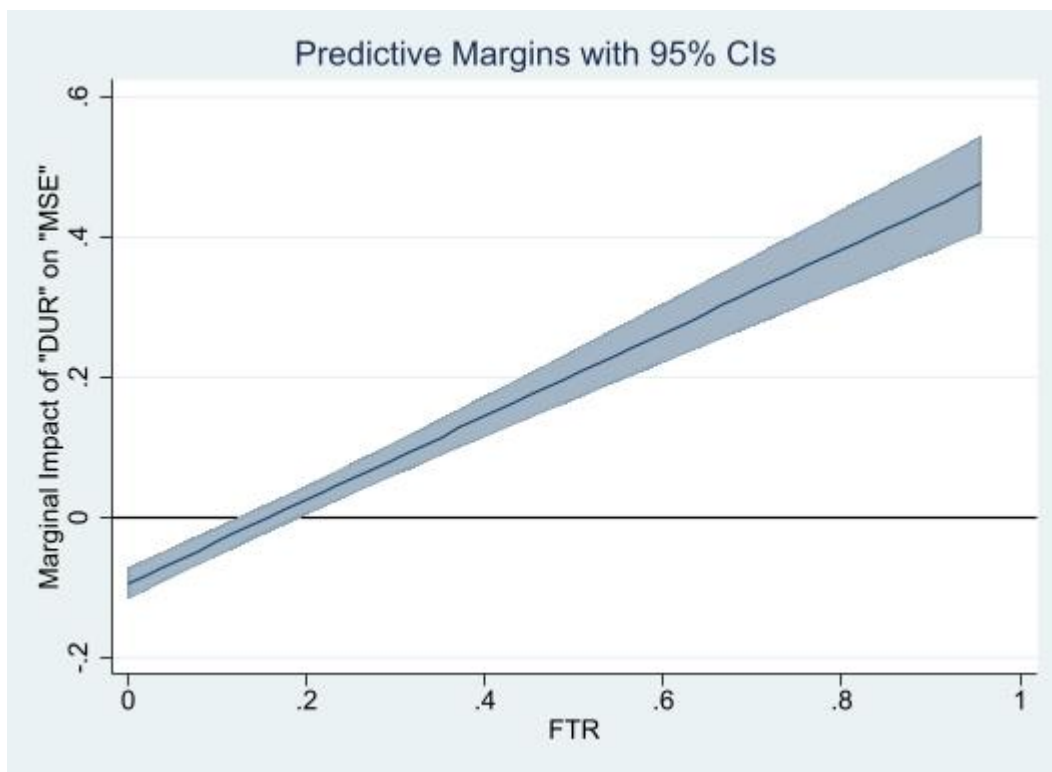
Source: Author

Figure 9: Marginal Impact of "DUR" on "CSE" conditioned on the level of FTR



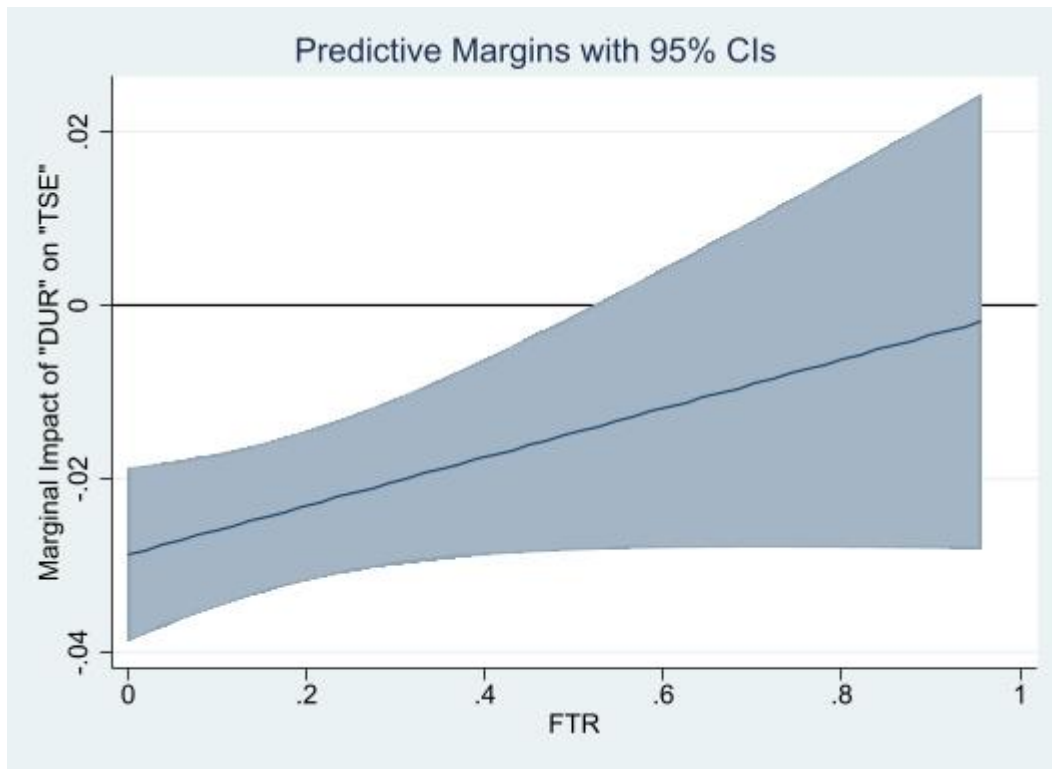
Source: Author

Figure 10: Marginal Impact of "DUR" on "MSE" conditioned on the level of FTR



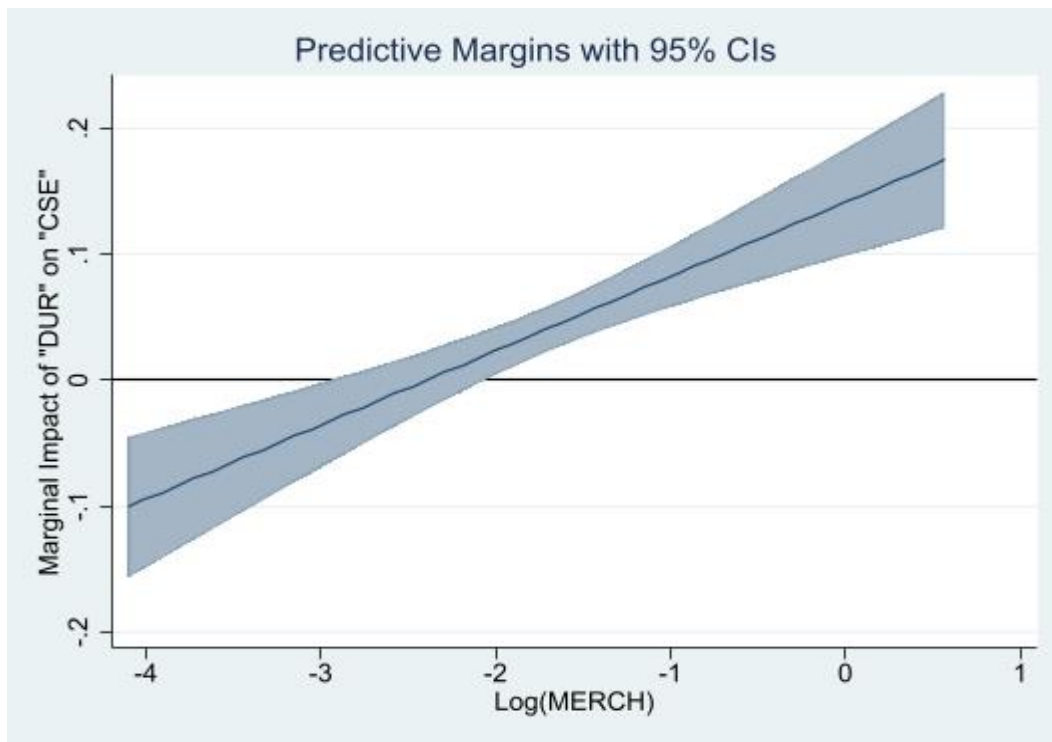
Source: Author

Figure 11: Marginal Impact of "DUR" on "TSE" conditioned on the level of FTR



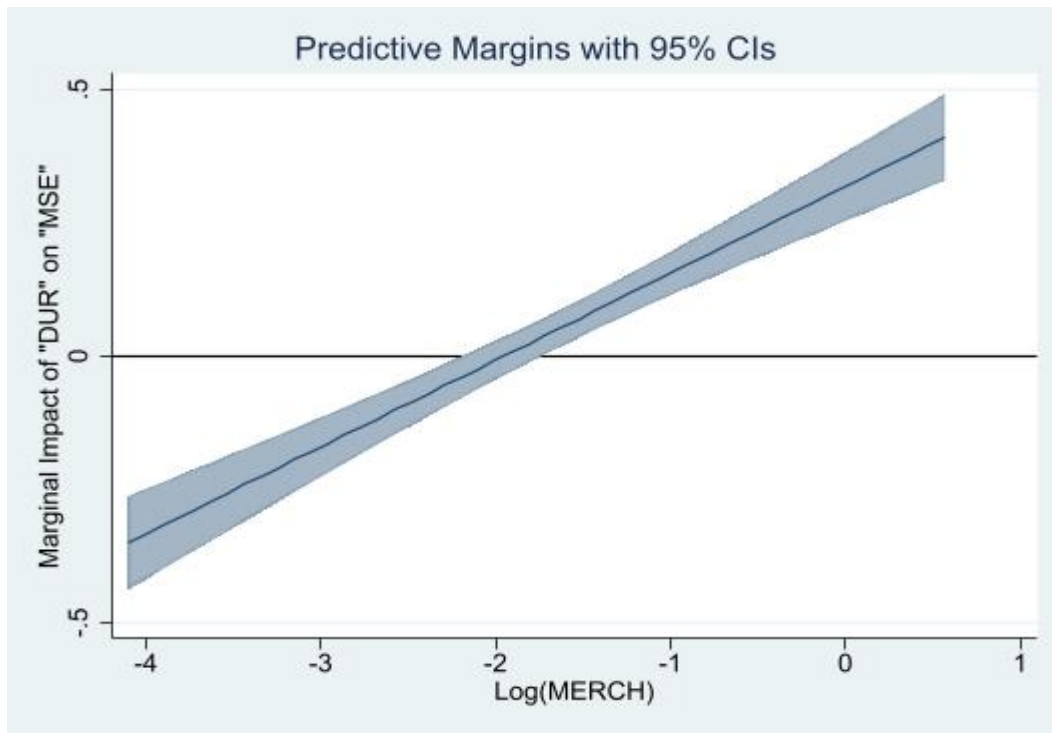
Source: Author

Figure 12: Marginal Impact of "DUR" on "CSE" conditioned on the share of merchandise exports in GDP



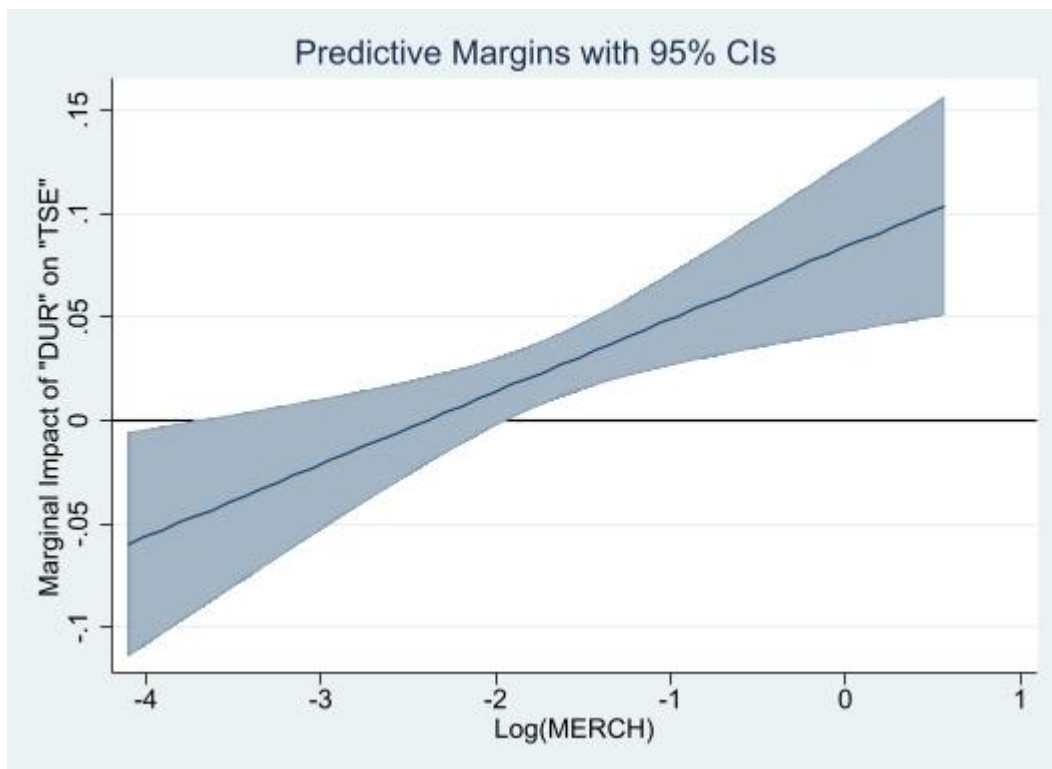
Source: Author

Figure 13: Marginal Impact of "DUR" on "MSE" conditioned on the share of merchandise exports in GDP



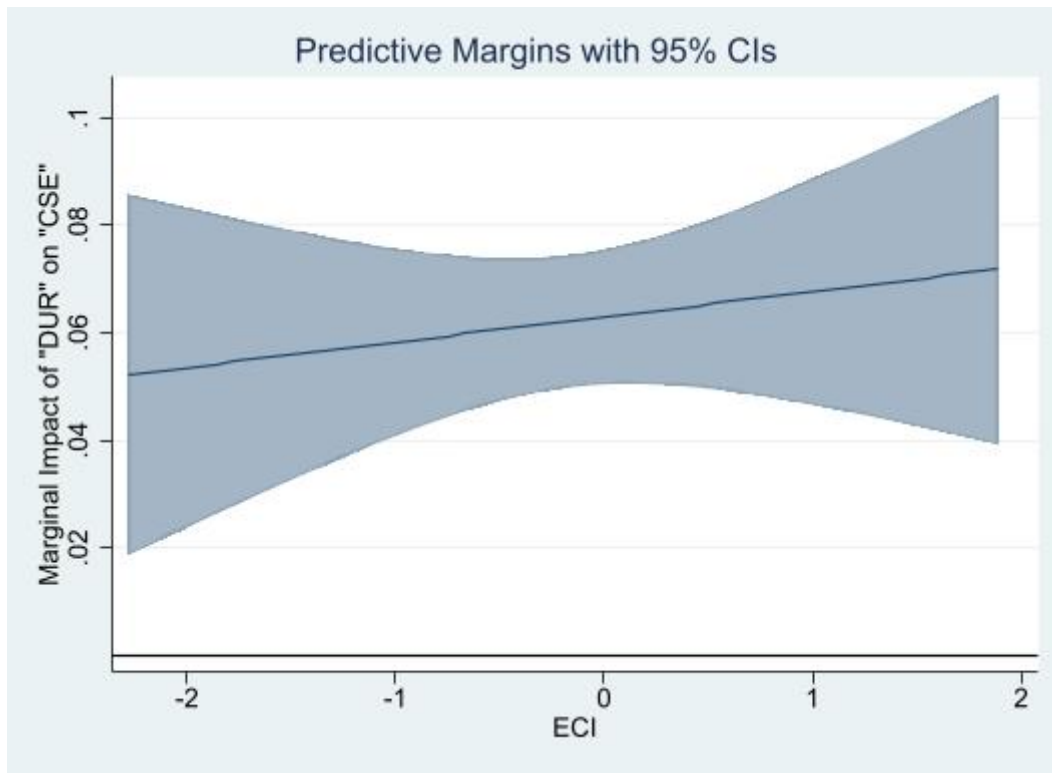
Source: Author

Figure 14: Marginal Impact of "DUR" on "TSE" conditioned on the share of merchandise exports in GDP



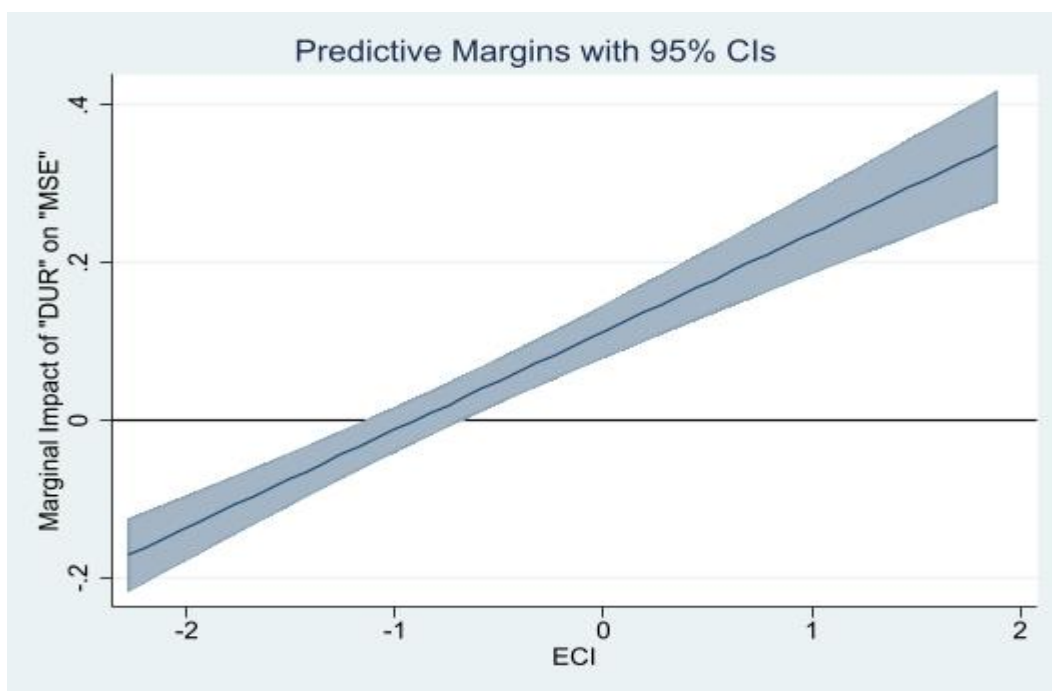
Source: Author

Figure 15 Marginal Impact of "DUR" on "CSE" conditioned on the level of economic complexity



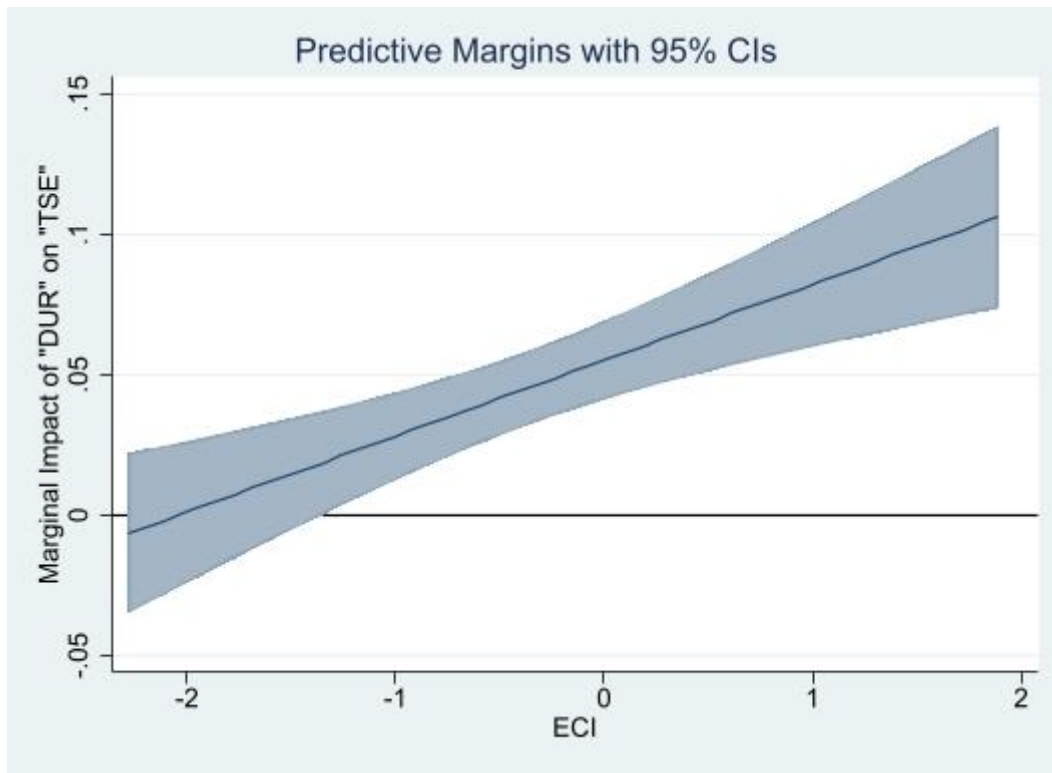
Source: Author

Figure 16: Marginal Impact of "DUR" on "MSE" conditioned on the level of economic complexity



Source: Author

Figure 17: Marginal Impact of "DUR" on "TSE" conditioned on the level of economic complexity



Source: Author